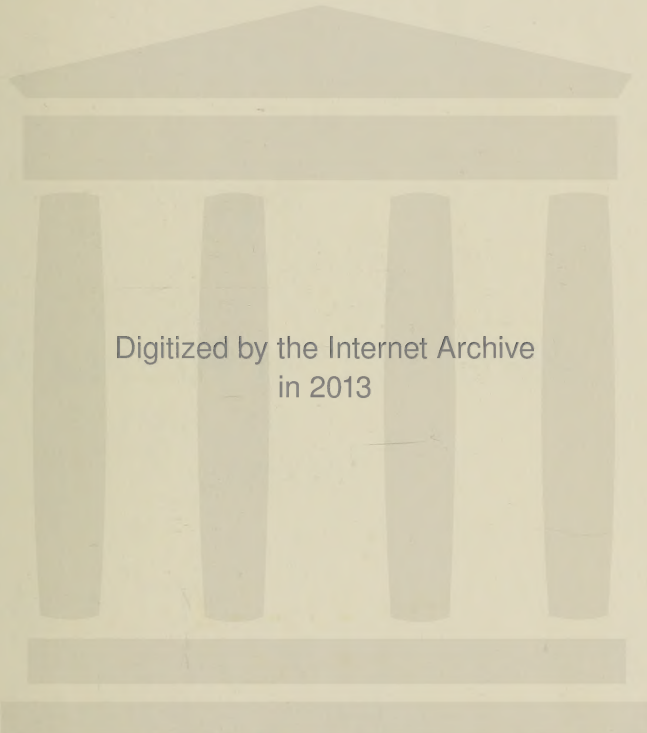


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GRADUATE DEPARTMENT
OF THE
University of the State of Missouri

COURSES OF INSTRUCTION

FOR
1900-1901

COLUMBIA, MISSOURI

10-23-1

Graduate Department.

FACULTY.

RICHARD HENRY JESSE, LL. D.,

President and Professor of Ancient and Mediaeval History.

Student at University of Virginia, 1873-5 and part of 1878; Dean of the Academic Department, University of Louisiana, 1878-84; Professor of Latin, Tulane University, 1884-91; Studied in Europe part of 1885 and 1890; LL. D., Tulane University, 1891; President of the University of the State of Missouri, 1891—.

PAUL SCHWEITZER, Ph. D., LL. D.,

Professor of Agricultural Chemistry, and Chemist to the Experiment Station.

Student under Schneider, Sonnenschein and H. Rose at Berlin, 1858-60; Chemist to the Soda Ash Works, Schoeningen, 1860-2; Chemist to the Chemical Works at Detmold, 1862-3; Assistant Professor of Chemistry, Polytechnic Institute, Philadelphia, 1864-6; Assistant in School of Mines, Columbia College, 1866-72; Ph. D., University of Goettingen, 1869; LL. D., University of the State of Missouri, 1897; Professor in the University of the State of Missouri, 1872—.

ANDREW WALKER McALESTER, A. M., M. D., LL. D.,

Professor of Surgery and Diseases of Women and Children.

A. B., University of the State of Missouri, 1865; M. D., 1866; A. M., 1868; Professor of Surgery, Medical Department, 1873-1880; LL. D., University of the State of Missouri, 1897; Professor of Surgery and Dean of the Medical Department, 1880—.

WOODSON MOSS, M. D.,

Professor of the Practice of Medicine.

M. D., University of the State of Missouri, 1874; Instructor in Medicine and Demonstrator of Anatomy, University of the State of Missouri, 1875-8; Professor of Anatomy and Demonstrator, 1878-83; Professor of Anatomy and Physiology, 1883-91; Studied in Europe, 1890; Professor of Anatomy and the Practice of Medicine, 1891-1900; Professor of the Practice of Medicine, 1900—.

JOHN CARLETON JONES, A. M., Ph. D.,

Professor of Latin Language and Literature.

A. B., Westminster College, 1879; A. M., 1882; Ph. D., 1891; Professor of Latin, Westminster College, 1880-2; Graduate Student at Johns Hopkins University, 1882-3; Assistant Professor of Latin and Greek, University of the State of Missouri, 1883-7; Associate Professor of Latin, 1887-91; Student at University of Leipzig and at Rome, 1895-6; Professor of Latin, University of the State of Missouri, 1891—.

EDWARD ARCHIBALD ALLEN, Litt. D.,

Professor of English Language and Literature.

Student at Randolph-Macon College, 1861-2; Student at University of Virginia, 1866-8; Professor of Latin and Greek, Farmville College (Va.), 1873-81; Professor of English and Modern Languages, Central College, 1881-5; Litt. D., Washington and Lee University, 1890; Professor of English, University of the State of Missouri, 1885—.

HENRY CAPLES PENN, A. M.,

Assistant Professor of English Language and Literature.

A. B., Central College, 1885; Instructor in Latin, Greek, and English, Hendrix College (Arkansas), 1885-7; Student at Harvard University, 1892-4; A. M., Harvard University, 1893; Assistant Professor of English, University of the State of Missouri, 1887—.

JAMES AULL YANTIS, LL. B.,

Professor of Law.

MILLARD LEWIS LIPSCOMB, A. M.,

Professor of Physics.

A. M., Bethany College (West Va.), 1874; Instructor in William and Mary College, 1874-5; Professor in William and Mary College, 1875; Professor of Physical Science, South Kentucky College, 1879-89; Professor of Physics, University of the State of Missouri, 1889—.

ALEXANDER MARTIN, A. M., LL. D.,

Professor of Law and Dean of the Law Faculty.

WILLIAM GWATHMEY MANLY, A. M.,

Professor of Greek Language and Literature.

Student at University of Virginia, 1882-4; Assistant Head Master McCabe's University School, 1884-6; Professor of Greek, Mercer University, 1886-9; A. M., Harvard University, 1890; Professor of Greek, University of the State of Missouri, 1890—.

CHRISTIAN WILLIAM MARX, B. E.,

Professor of Mechanical Engineering and Superintendent of Mechanic Arts.

B. E., Washington University, 1887; Engineer and Assistant Superintendent of Morden Frog and Crossing Works, 1887-90; Superintendent of Indianapolis Frog and Switch Company, 1890-1; Superintendent of Department of Mechanic Arts, University of the State of Missouri, 1891—; Professor of Mechanical Engineering, 1893—.

JOHN WALDO CONNAWAY, D. V. S., M. D.,

Professor of Comparative Medicine and Veterinarian to the Experiment Station.

M. D., University of the State of Missouri, 1891; Student at Johns Hopkins University, 1894-5; Professor of Physiology, University of the State of Missouri, 1891-7; Professor of Physiology and Veterinarian to the Experiment Station, 1897-1900; Professor of Comparative Medicine and Veterinarian to the Experiment Station, 1900—.

JOHN DAVISON LAWSON, B. C. L., LL. D.,

Professor of Law.

FREDERICK CHARLES HICKS, B. A., Ph. D.,

Professor of Economics.

B. A., University of Michigan, 1886; Ph. D., 1890; Instructor in University of Michigan, 1891-2; Studied in Europe, 1896-7; Professor of Economics, University of the State of Missouri, 1892—.

JOHN PICKARD, A. M., Ph. D.,

Professor of Classical Archaeology and History of Art.

A. B., Dartmouth College, 1883; A. M., 1886; Student at the University of Leipzig, 1889, University of Berlin, 1890, 1895; in the American School of Classical Studies at Athens, 1890-1; at University of Munich, 1891-2; Ph. D., University of Munich, 1892; Professor of Classical Archaeology, University of the State of Missouri, 1892—.

FRANK THILLY, B. A., Ph. D.,

Professor of Philosophy.

A. B., University of Cincinnati, 1887; Student at the University of Berlin, 1887-9; Student at the University of Heidelberg, 1889-91; A. M., Ph. D., University of Heidelberg, 1891; Fellow in Philosophy, Cornell

University, 1891-2; Instructor of Logic and the History of Philosophy, Cornell University, 1892-3; Professor of Philosophy in the University of the State of Missouri, 1893—.

HARRY THOMAS CORY, M. M. E., M. C. E.,

Professor of Civil Engineering.

B. S., Purdue University, 1887; B. S. in C. E., 1889; M. C. E., Cornell University, 1893; M. M. E., 1896; Assistant Engineer A. & M. Railway, 1888; Assistant City Engineer, Lafayette, Indiana, 1889; Deputy County Engineer, Tippecanoe County, 1890-2; Professor of Civil Engineering, University of the State of Missouri, 1893—.

LUTHER MARION DEFOE, A. B.,

Assistant Professor of Mathematics.

Teaching Fellow in Mathematics, University of the State of Missouri, 1891-2; A. B., Harvard University, 1893; Acting Professor of Mathematics, University of the State of Missouri, 1893-4; Assistant Professor of Mathematics, 1894-7; Acting Professor of Mathematics, 1897-8; Assistant Professor of Mathematics, 1898—.

JOHN CHARLES WHITTEN, B. S., M. S.,

Professor of Horticulture and Horticulturist to the Experiment Station.

B. S., South Dakota Agricultural College, 1891; M. S., 1899; Instructor in Horticulture and Horticulturist to the Experiment Station, South Dakota Agricultural College, 1892; Student at Cornell University, 1892; Assistant in Horticulture, Missouri Botanical Garden, 1893-4; Professor of Horticulture and Horticulturist to the Experiment Station, University of the State of Missouri, 1894—.

SIDNEY CALVERT, B. Sc., A. M.,

Assistant Professor of Chemistry.

B. Sc., McGill University, 1890; Graduate Student, Harvard University, 1890-4; A. M., 1892; Assistant in Chemistry, Harvard University, 1892-4; Private Research Assistant, 1892-4; Assistant Professor of Chemistry, University of the State of Missouri, 1894—.

HENRY JACKSON WATERS, B. S. A.,

Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station.

B. S. A., University of the State of Missouri, 1886; Assistant Secretary, Missouri State Board of Agriculture, 1886-8; Assistant in Agriculture to the Missouri Experiment Station, 1888-91; Professor of Agriculture in the Pennsylvania State College and Agriculturist to the Experiment Station, 1892-5; Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station, University of the State of Missouri, 1895—.

ISIDOR LOEB, M. S., LL. B.,

Professor of History.

B. S., University of the State of Missouri, 1887; M. S., LL. B., 1893; Tutor in History, 1892-4; Fellow in Columbia University, 1894-5; Assistant Professor of History, University of the State of Missouri, 1895-1900; Student at University of Berlin, 1899-1900; Professor of History, University of the State of Missouri, 1900—.

BENJAMIN FRANKLIN HOFFMAN, B. L., M. L.,

Professor of Germanic Languages.

B. L., University of the State of Missouri, 1884; M. L., 1888; Assistant Professor of Modern Languages, University of the State of Missouri, 1887-92; Student in Paris and Munich, 1892-3; Professor of Modern Languages, University of Louisiana, 1893-5; Student at the University of Chicago, Summer Session, 1895, 1896; Professor of Germanic Languages, University of the State of Missouri, 1895—.

FREDERICK BLACKMAR MUMFORD, M. S.,

Professor of Agriculture.

B. S., Michigan Agricultural College, 1891; M. S., 1893; Assistant in Michigan Agricultural Experiment Station, 1891-5; Assistant Professor of Agriculture, Michigan Agricultural College, 1893-5; Professor of Agriculture, University of the State of Missouri, 1895—.

HENRY MARVIN BELDEN, Ph. D.,

Assistant Professor of English.

A. B., Trinity College, 1888; Ph. D., Johns Hopkins University, 1895; Instructor in English, Lehigh University, 1890-1; University of Nebraska, 1893-4; Student University of Strassburg, 1894-5; Assistant Professor of English, University of the State of Missouri, 1895—.

JOHN MOORE STEDMAN, B. Sc.,

Professor of Entomology and Entomologist to the Experiment Station.

B. Sc., Cornell University, 1888; Instructor in Invertebrate Zoology and Entomology, University of the State of Missouri, and Entomologist to the Experiment Station, 1888-90; Biologist to the United States Department of Agriculture, 1890-1; Professor of Biology, Trinity College, 1891-3; Professor of Biology, Alabama Polytechnic Institute, Agricultural and Mechanical College, and Biologist to the Experiment Station, 1893-95; Professor of Entomology, University of the State of Missouri, and Entomologist to the Experiment Station, 1895—.

RAYMOND WEEKS, A. M., Ph. D.,

Professor of Romance Languages.

A. B., Harvard University, 1890; A. M., 1891; Instructor in French, University of Michigan, 1891-3; Traveling Fellow to Harvard University (Paris and Berlin), 1893-5; Ph. D., Harvard, 1897; Professor of Romance Languages, University of the State of Missouri, 1895—.

WILLIAM GEORGE BROWN, B. S., Ph. D.,

Professor of Chemistry.

JOHN RUTLEDGE SCOTT, A. M.,

Professor of Elocution.

A. B., Ohio University, 1864; A. M., 1867; Instructor in Elocution, Washington University, 1877-88; Instructor in Vocal Culture, Johns Hopkins University, 1893-7; Professor of Elocution, University of the State of Missouri, 1897—.

HOWARD BURTON SHAW, B. C. E., A. M.,

Professor of Electrical Engineering.

A. B., University of North Carolina, 1890; B. C. E., 1891; Instructor in Mathematics, University of North Carolina, 1889-90, and Instructor in Mathematics, Surveying and Drawing, 1891-3; in Engineering Work with Phoenix Iron Company, 1892; A. M., Harvard University, 1894; Assistant in Electrical Engineering Laboratory, Lawrence Scientific School, Harvard University, 1894-6; in Engineering Work with Consolidated Traction Company, 1896; Assistant Professor of Electrical Engineering, University of the State of Missouri, 1896-9; Professor of Electrical Engineering, 1899—.

CURTIS FLETCHER MARBUT, B. S., A. M.,

Professor of Geology and Mineralogy.

B. S., University of the State of Missouri, 1889; Student at Harvard University, 1893-5; A. M., Harvard University, 1894; Instructor in Geology and Mineralogy, University of the State of Missouri, 1895-7; Assistant Professor of Geology and Mineralogy, 1897-1900; Studied in Europe, 1899-1900; Professor of Geology and Mineralogy, 1900—.

YOUNGER PITTS ROTHWELL, A. M.,

Professor of Physical Culture and Director of Gymnasiums.

A. B., William Jewell College, 1886; A. M., 1887; Instructor in William Jewell College, 1887-91; Student in University of Strassburg, 1891, Paris, 1892; Berlin, 1892-3; Movement Cure Institute (New York), 1893; Professor of

Physical Culture, William Jewell College, 1893-8; Professor of Physical Culture, University of the State of Missouri, 1898—.

JOHN NELSON FELLOWS, A. M.,

Professor of Mathematics.

B. S., University of the State of Missouri, 1892; M. S., 1893; Student in Harvard University, 1893-5; A. M., Harvard University, 1894; Student in University of Goettingen, 1895-6; Professor of Mathematics and Physics, Peekskill Military College, 1896-8; Professor of Mathematics, University of the State of Missouri, 1898—.

PAUL KAUFMANN, M. D.,

Professor of Bacteriology and Pathology.

Student at University of Berlin, 1883-4; University of Zuerich, 1884; Received State Diploma as Physician from University of Strassburg, 1889; M. D., University of Strassburg, 1890; Pathological Assistant, Senckenberg's Institute, Frankfurt, 1891; Professor of Pathology and Bacteriology in Medical School, Cairo (Egypt), 1892-6; Bacteriological Surveyor, Cairo Water Company, 1894-6; Director of Private Laboratory in Berlin, 1896-8; Professor of Bacteriology and Pathology, University of the State of Missouri, 1898—.

JOSEPH MARTIN WHITE, A. B.,

Professor of Pedagogy.

Graduate of Kirksville Normal School, 1874; Superintendent of the Louisiana (Mo.) Schools, 1875-7; of the Carrollton Schools, 1878; A. B., Michigan University, 1881; Superintendent of the Carthage Schools, 1885-95; School Examiner for the University of the State of Missouri, 1897-9; Professor of Pedagogy, University of the State of Missouri, 1899—.

THOMAS NOLAN, B. S., Ph. B., M. S.,

Professor of Architecture.

B. S., University of Rochester, 1879; M. S., 1882; Ph. B., Columbia University, Department of Architecture, 1884; Practicing Architect, Rochester, N. Y., 1884-7; Student of Architectural and Engineering Works in Europe, and Student in Ecole des Beaux Arts, Paris, 1888-9; Practicing Architect, Rochester, 1890-7; Student in Greece and Italy, 1896; Graduate Student in Engineering and Architecture, Columbia University, 1897-8; Practicing Architect, New York City, 1897-8; Member of the Faculty of Architecture, University of Pennsylvania, 1898-9; Professor of Architecture, University of the State of Missouri, 1899—.

GEORGE LEFEVRE, A. B., Ph. D.,

Professor of Zoology.

A. B., Johns Hopkins University, 1891; Fellow, 1894-5; Bruce Fellow 1895-7; Ph. D., 1896; Assistant in Zoology and Embryology, Johns Hopkins University, 1897-8; Science Master, Boys' High School, Atlanta, 1898-9; Instructor in Zoology, Marine Biological Laboratory, Woods Holl, Mass., 1898-1900; Professor of Zoology, University of the State of Missouri, 1900—.

CLARENCE MARTIN JACKSON, B. S., M. S., M. D.,

Assistant Professor (in charge) of Anatomy and Histology.

B. S., University of the State of Missouri, 1898; M. S., 1899; M. D., 1900; Fellow in Biology, 1897-9; Assistant in Anatomy, 1899-1900; Assistant Professor of Anatomy and Histology, 1900—.

CHARLES BERRY NEWCOMER, Ph. D.,

A. B., University of Nebraska, 1889; M. A., 1890; Student at Berlin and Nancy, 1890-1; Professor of Greek and Latin, Cotner University, 1891-3; Student at University of Berlin, 1895-9; Ph. D., University of Berlin, 1899; Acting Assistant Professor of Latin, University of the State of Missouri, 1899—.

***JAMES WILLIAM KYLE, A. M.,**

Acting Professor of Greek Language and Literature.

A. B., Denison University, 1894; Professor of Latin, Grand Island College, Nebraska, 1894-6; Graduate Student, University of Chicago, 1897; Studied in Berlin, 1898; Student in the American School of Classical Studies at Athens, 1898-9; Graduate Student, University of Chicago, 1899-1900; A. M., University of Chicago, 1900.

*For the session of 1900-1901.

CHARLES A. ELLWOOD, Ph. D.,

Professor of Sociology.

Ph. B., Cornell University, 1896; Graduate Student, University of Chicago, 1896-7, 1898-9; Student in University of Berlin, 1897-8; Fellow in Sociology, University of Chicago, 1898-9; Ph. D., 1899; General Secretary of the Charity Organization Society of Lincoln, Nebraska, 1899-1900; Instructor in Sociology, University of Nebraska, 1899-1900; Professor of Sociology, University of the State of Missouri, 1900—.

CHARLES WILSON GREENE, Ph. D.,

Professor of Physiology and Pharmacology.

A. B., Leland Stanford Jr. University, 1892; A. M., 1893; Ph. D., Johns Hopkins University, 1898; Instructor in Zoology, Marine Biological Laboratory, Woods Holl, Mass., 1896, 1897; Fellow in Physiology, Johns Hopkins University, 1897-8; Assistant Professor of Physiology, Leland Stanford Jr. University, 1898-1900; Professor of Physiology and Pharmacology, University of the State of Missouri, 1900—.

*I. ACADEMIC.**Admission:*

Graduates of either sex of the Colleges and Universities comprising the Missouri College Union and of other reputable Colleges and Universities, and (in exceptional cases, by special permission of the Faculty) other persons of liberal education, are admitted to such graduate work as they are prepared for. The credentials of candidates for admission to this Department will be passed upon by the Dean.

Fellowships:

Fellowships are annually established where such additional teaching force is required. Holders of these fellowships are required to teach five or six hours a week, and receive therefor \$200; and they are exempt from the payment of fees and deposits. For further details, see page 51 of the general Catalogue.

During the year 1899-1900, fellowships were held in Germanic Languages, Romance Languages, Biology, Mathematics and Physiology.

Graduate Club:

A club has been organized by the graduate students for the purpose of furthering their social and scholastic interests in the University and of bringing themselves into touch with graduate student life elsewhere. This club has joined the Federation of Graduate Clubs of the leading American Universities, and the courses here offered are announced in the handbook published by the Federation.

Degrees:

1. *The Master's Degree.*—Applications for the Master's Degree in Arts or Science will be considered on the basis of one year's graduate study in the University. This year's study is understood to mean for Fellows at least eight (8) hours a week, for other students at least ten (10) hours a week throughout the scholastic year, or the full equivalent of such study.

All courses may be taken from one general subject; at least half must be. The majority of the courses must be from those offered for graduate students. Only advanced undergraduate electives shall be counted for this degree.

A creditable thesis evincing capacity for original research and power of independent thought, in the line of the student's previous work, shall be submitted on or before May 1 of the given year.

The subject of the thesis and the courses chosen shall be laid before the Committee on Graduate Degrees on or before November 1 of each year.

At the close of the scholastic year the University Council may, on the report of this Committee, recommend to the Board of Curators for this degree such candidates as have satisfactorily fulfilled these conditions.

2. *The Master's Degree and Life Certificate.*—Candidates for the Master's Degree who wish the Life Certificate to teach in Missouri may obtain this in the following manner: In each semester they shall elect Senior Pedagogy, 3 hours a week, as a portion of the ten hours a week required for the Master's Degree. The remaining 7 hours required for this degree must be of a strictly graduate character. The candidate shall, in addition, elect Junior Pedagogy, 3 hours a week for both semesters. On the satisfactory completion of these 13 hours a week for each semester the candidate may receive the Master's Degree and the Life Certificate.

3. *The Doctor's Degree.*—The candidate will be expected to spend at least three years, or, if he have a Master's Degree, at least two years, in graduate study under University direction; but with the consent of the Faculty, one of these years may in either case be spent *in absentia*.

The candidate must have a Bachelor's Degree in Arts, Letters, Science, or Philosophy, from some reputable University or College, and must attain in graduate study at this University a high proficiency in one branch of learning, and a respectable proficiency in at least one other. He must submit a dissertation embodying the results of original investigation, and must pass examinations in his major and minor subjects.

Candidates who have satisfactorily met these conditions may be recommended for the Doctor's Degree in the manner prescribed above for candidates for the Master's Degree.

COURSES OF INSTRUCTION.

CHEMISTRY.

Professors Brown and Calvert:

1. Chemical Theory. Lectures and recitations. *Second semester, three hours a week.*

2. History of Chemistry. Lectures and recitations. *First semester, three hours a week.*

3. Physical Chemistry. Lectures, laboratory work, and recitations. *Second semester, three times a week.*

4. Research. This will consist principally of original work and investigations in laboratory and library and will be adapted in some measure to individual cases.

CLASSICAL ARCHAEOLOGY.

1. Topography and Monuments of Athens. *Two hours a week.* Jahn's "Pausaniæ Descriptio Arcis Athenarum," and Schubart's text of Pausanias will be studied and interpreted in the light of most recent excavations and publications. The disputed points of Athenian topography will be discussed and the attempt will be made, with the aid of plans and photographs, to obtain as clear ideas as possible of both ancient and modern Athens.

2. Archæological Seminary. *Two hours a week.* A study of the description, explanation, and interpretation of works of Greek Art will be made. Both sculpture and vase paintings will be discussed and important points in the history of Greek Art and Greek artists will be considered.

ENGLISH.

Professors Allen, Penn and Belden:

1. Studies in Anglo-Saxon, based on Beowulf and the Wuelker-Grein Bibliothek. *Three times a week.*

2. Gothic. An introduction to Germanic Philology, with special reference to English. *Three times a week.*

3. Tennyson and Browning. A course in the criticism and appreciation of modern English poetry. *Twice a week.*

GEOLOGY.

Professor Marbut:

1. Geomorphology. Special study of land form. Lectures, library, laboratory and field work. *Three times a week.*

2. Investigator's Course. The mapping and correlation of the small detached areas of coal measure deposits in the vicinity of Columbia.

GERMANIC LANGUAGES.

Professor Hoffman:

1. Middle High German is offered in the first semester. Grammar; reading from Wolfram von Eschenbach: "Gamuhret und Herzeloide," "Parzivals Jugend und Eintritt in's Leben"—translation into good modern High German, noting changes in construction, phraseology, and meaning of words; with lectures on the literature of the period. *Three hours a week.*

1a. Historical German Grammar. *Twice a week.*

2. German Literature of the Eighteenth and Nineteenth Centuries. This course continues through the first and second semesters. *Three hours a week.*

3. A course in Old High German is offered in the second semester; Braune's Grammatik and Lesebuch; reading various fragments, and a portion from Tatian, Otfried, Notker, and Williram's Lied; philological study in connection with it. *Three hours a week.*

NOTE.—Either course 1, or 1a, in the first semester can be given, not both.

GREEK.

*Professor Manly; Acting Professor Kyle:

1. Historical Grammar. *Two hours a week.*

2. Seminary for advanced study. The work for the session of 1900-1901 will be in Euripides.

ECONOMICS.

Professor Hicks:

Seminarium in Economics and Finance. *Two hours a week.*

LATIN.

Professor Jones; Assistant Professor Newcomer:

1. History of the Latin Language. *Twice a week both semesters.* This course embraces a historical study of the sounds, inflections and syntax of Latin. It is taught wholly by lectures, but requires much collateral reading.

2. Seminary. The critical study of a selected author. For the session 1900-1901, Terence has been chosen.

MATHEMATICS.

Professor Fellows; Assistant Professor Defoe:

11. Trigonometric Series, Spherical Harmonics, Potential Function.

12. Theory of Functions (introductory course).

13. Theory of Functions (second course).

Courses 12 and 13 are usually given in alternate years.

PHILOSOPHY.

Professor Thilly:

Modern Criticism. A study of the development of the critical problem in modern philosophy from the side of empiricism. Especial attention will be given to Locke's Essay Concerning Human Understanding. Berkeley's Principles of Human Knowledge, Hume's Treatise on Human Nature, and Kant's Critique of Pure Reason. This course is open only to such students as have completed courses in Psychology, Logic, Ethics, and the History of Philosophy, and possess a good reading knowledge of Latin, French and German. *Three times a week for two semesters.*

*Absent for session of 1900-1901.

Professor ————:

Seminary for Psychology and Advanced Laboratory work. *Three times a week for two semesters.*

PHYSICS.

Professor Lipscomb:

Laboratory. Advanced Measurements and Special Investigations. Open only to those who have had Undergraduate Courses 4, 7a, 7b, 8a and 8b, or an equivalent amount of work. *Three to five times a week.* See announcement of Academic department in the General Catalogue, under Physics.

ROMANCE LANGUAGES.

Professor Weeks:

1. Old French. Paris and Langlois' *Chrestomathie*, with lectures. *M. W. F., at 10:30.* This course is open to Graduates properly qualified, and to any Senior who has made a specialty of Romance Languages to the extent of having completed with high credit Undergraduate Courses 1, 2, 3 and 4 (see Academic department in the General Catalogue, Romance Languages"). The epic poem, *Ajol*, will be read, with close attention to the elements that enter into the poem, the object being to present to the student a practical illustration of text criticism. The course is conducted entirely in French.

2. Phonetics. A general introduction to Philology. *First semester, M. W. F., at 2.* This course is one of general interest to students of Philology. The work consists of two parts: historical and practical. The practical work includes an effort to get at the production of speech-sounds from the physiological standpoint. Such works as Grandgent's *English and German Sounds* (Ginn & Co.) are used. Numerous tracings showing the actions of the organs of speech are discussed. The University has established a Laboratory of Experimental Phonetics for the more accurate study of the living speech.

3. Seminar. *Two hours per week.* Opportunity will here be given for advanced work in various subjects which may seem desirable.

SOCIOLOGY.

Professor Ellwood:

1. Social Psychology. A study of the writings of Tarde, Le Bon, and Baldwin with some attempt to make use of psychological principles in the interpretation of social phenomena. Open only to those who have special permission from the Instructor. *Second semester, T. Th. S., at 9:30.*

2. History of Social Philosophy. The development of social thought from Aristotle to the present. This course will not be given in the session of 1900-1901.

3. Seminar. Spencer's *Principles of Sociology*. Critical study of the text and discussions. *Tuesday, 4:00 to 6:00.* Two hours credit.

ZOOLOGY.

Professor Lefevre:

1. Neurology. A course in the study of the central nervous system and terminal sense-organs of vertebrates, open only to such students as have completed undergraduate courses in the Comparative Anatomy and Histology of Vertebrates. *Second semester, three times a week.* Lecture, M., at 8:30; Laboratory, W. F., at 8:30.

2. Cytology. A study of the cell, with special reference to development and inheritance. Training is also given in the use of finer methods of technique in cytological research. *First semester, three times a week.* Lecture, M., at 8:30; Laboratory, W. F., at 8:30.

3. The Principles of Zoology. A course of lectures, with collateral reading, designed to cover the main principles underlying zoological science. *First semester, three times a week, W. F., at 1:30.*

4. Investigation. A course of special research into unsolved problems of Zoology. The student is trained in the exercise of original observation and thought. Subjects assigned for investigation during the year 1900-1901 will be in Cytology and Experimental Morphology. *Throughout the year.* Hours will be arranged in accordance with the requirements of individual students.

5 Zoological Seminary. Weekly meetings throughout the year, at which current topics of zoological investigation are reported and discussed by instructors and students.

II. COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

SCHOOL OF AGRICULTURE.

Candidates for the degree of Master of Science in Agriculture are required to do one year's graduate work at the University. This work must consist of at least 10 hours a week throughout the year and the subjects selected must be advanced courses, and must be approved by the Dean and the Committee on Graduate Degrees.

SCHOOL OF ENGINEERING.

Graduate work in Civil, Electrical, and Mechanical Engineering is offered at Columbia to those who have finished the undergraduate courses in these subjects respectively with the degree of Bachelor of Science. Students that entering under these conditions have completed a year of graduate work and passed satisfactory examinations thereon, and presented a thesis of real merit, will receive, according to the course in which they have studied, the degree of Civil Engineer (C. E.), Electrical Engineer (E. E.), or Mechanical Engineering (M. E.). Graduate work in Hydraulic Engineering is offered to those who have completed the work in Civil and Mechanical Engineering.

The thesis subject shall be presented to the Committee on Graduate Degrees on or before November 1, and the thesis shall be presented to the same Committee on or before May 1, of the given year.

See announcement of this School.

III. LAW.

One year of advanced work leading to the degree of LL. M.

The course is open to graduates of the Law department and of other law schools who have completed an equivalent course of study.

The object of this course is to provide the practitioner with a more extended and practical knowledge of important subjects embraced in modern law, than the limited time of the undergraduate course permits. It is also intended to afford him assistance in prosecuting the study of any particular subject or branch of law which he expects to follow in his future practice.

The course of instruction embraces lectures, recitations and independent investigation on the following subjects:

Constitutional Law, Corporations, Insurance, Trusts, Patents, Copyrights, Law of Homicide, Theory of Jurisprudence, Practice.

The student is allowed to select any special subject in law for extended examination, to be prosecuted concurrently with the subjects embraced in the course. His investigations are directed by the Faculty, who advise him of the books and cases to consult, and afford him assistance and counsel.

It is believed that many licensed attorneys will find it to their advantage to take as special students such instruction.

The text-books recommended for the Graduate course are as follows:

Cooley on Constitutional Limitations; Lewin on Trusts; May on Insurance; Walker on Patents; Bishop on Criminal Law; Thompson on Corporations; Holland and Pollock on Theory of Jurisprudence; Pattison's Forms.

A thesis subject shall be selected and presented to the Committee on Graduate Degrees on or before November 1. The thesis shall be submitted to the same Committee on or before May 1, of the given year.

See announcement of the Law department.

OTHER COURSES.

Other courses of study offered among the Academic studies are accepted as graduate in rank. A copy of the complete Catalogue of the University will be sent upon application.

GRADUATE DEPARTMENT.

FEES AND EXPENSES.

The fee is \$5.00 for a session or any part thereof. This applies to all Departments of the University. Students taking laboratory work must make small laboratory deposits. Room rent, table board, fuel and lights cost from \$2.00 to \$4.50 a week. In the clubhouses of the University the cost does not exceed \$2.00 a week.

For further information, address

JOHN PICKARD,
Columbia, Missouri.

GRADUATE DEPARTMENT
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COURSES OF INSTRUCTION

FOR
1901-1902

COLUMBIA, MISSOURI

GRADUATE DEPARTMENT.

FACULTY.

RICHARD HENRY JESSE, LL. D.,

President and Professor of Ancient and Mediaeval History.

Student at University of Virginia, 1873-5 and part of 1878; Dean of the Academic Department, University of Louisiana, 1878-84; Professor of Latin, Tulane University, 1884-91; Studied in Europe part of 1885 and 1890; LL. D., Tulane University, 1891; President of the University of the State of Missouri, 1891—.

PAUL SCHWEITZER, Ph. D., LL. D.,

Professor of Agricultural Chemistry, and Chemist to the Experiment Station.

Student under Schneider, Sonnenschein and H. Rose at Berlin, 1858-60; Chemist to the Soda Ash Works, Schoeningen, 1860-2; Chemist to the Chemical Works at Detmold, 1862-3; Assistant Professor of Chemistry, Polytechnic Institute, Philadelphia, 1864-6; Assistant in School of Mines, Columbia College, 1866-72; Ph. D., University of Goettingen, 1869; LL. D., University of the State of Missouri, 1897; Professor in the University of the State of Missouri, 1872—.

ANDREW WALKER MCALISTER, A. B., M. D., LL. D.,

Professor of Surgery and Diseases of Women and Children.

A. B., University of the State of Missouri, 1865; M. D., 1866; A. M., 1868; Professor of Surgery, Medical Department, 1873-80; LL. D., University of the State of Missouri, 1897; Professor of Surgery and Dean of the Medical Department, 1880—.

WOODSON MOSS, M. D.,

Professor of the Practice of Medicine.

M. D., University of the State of Missouri, 1874; Instructor in Medicine and Demonstrator of Anatomy, University of the State of Missouri, 1875-8; Professor of Anatomy and Demonstrator, 1878-83; Professor of Anatomy and Physiology, 1883-91; Studied in Europe, 1890; Professor of Anatomy and the Practice of Medicine, 1891-1900; Professor of the Practice of Medicine, 1900—.

JOHN CARLETON JONES, A. B., Ph. D.,

Professor of Latin Language and Literature.

A. B., Westminster College, 1879; A. M., 1882; Ph. D., 1891; Professor of Latin, Westminster College, 1880-2; Graduate Student at Johns Hopkins University, 1882-3; Assistant Professor of Latin and Greek, University of the State of Missouri, 1883-7; Associate Professor of Latin, 1887-91; Student at University of Leipzig and at Rome, 1895-6; Professor of Latin, University of the State of Missouri, 1891—.

EDWARD ARCHIBALD ALLEN, Litt. D.,

Professor of English Language and Literature.

Student at Randolph-Macon College, 1861-2; Student at University of Virginia, 1866-8; Professor of Latin and Greek, Farmville College (Va.), 1873-81; Professor of English and Modern Languages, Central College, 1881-5; Litt. D., Washington and Lee University, 1890; Professor of English, University of the State of Missouri, 1885—.

HENRY CAPLES PENN, A. B., A. M.,

Assistant Professor of English Language and Literature.

A. B., Central College, 1885; Instructor in Latin, Greek, and English, Hendrix College (Arkansas), 1885-7; Student at Harvard University, 1892-4; A. M., Harvard University, 1893; Assistant Professor of English, University of the State of Missouri, 1887—.

Missouri Univ. — Graduate Dept.

JAMES AULL YANTIS, LL. B.,

Professor of Law.

LL. B., University of the State of Missouri, 1875; Professor of Law, University of the State of Missouri, 1887—.

MILLARD LEWIS LIPSCOMB, A. M.,

Professor of Physics.

A. M., Bethany College (West Va.), 1874; Instructor in William and Mary College, 1874-5; Professor in William and Mary College, 1875; Professor of Physical Science, South Kentucky College, 1879-89; Professor of Physics, University of the State of Missouri, 1889—.

ALEXANDER MARTIN, A. B., LL. D.,

Professor of Law and Dean of the Law Faculty.

A. B., University of Michigan, 1855; A. M., 1858; LL. B., Harvard University, 1858; LL. D., University of the State of Missouri, 1890; Professor of Law and Dean of the Law Faculty, 1889—.

WILLIAM GWATHMEY MANLY, A. M.,

Professor of Greek Language and Literature.

Student at University of Virginia, 1882-4; Assistant Head Master, McCabe's University School, 1884-6; Professor of Greek, Mercer University, 1886-9; A. M., Harvard University, 1890; Professor of Greek, University of the State of Missouri, 1890—.

CHRISTIAN WILLIAM MARX, B. E.,

Professor of Mechanical Engineering and Superintendent of Mechanic Arts.

B. E., Washington University, 1887; Engineer and Assistant Superintendent of Morden Frog and Crossing Works, 1887-90; Superintendent of Indianapolis Frog and Switch Company, 1890-1; Superintendent of Department of Mechanic Arts, University of the State of Missouri, 1891—; Professor of Mechanical Engineering, 1893—.

JOHN WALDO CONNAWAY, D. V. S., M. D.,

Professor of Comparative Medicine and Veterinarian to the Experiment Station.

M. D., University of the State of Missouri, 1891; Student at Johns Hopkins University, 1894-5; Professor of Physiology, University of the State of Missouri, 1891-7; Professor of Physiology and Veterinarian to the Experiment Station, 1897-1900; Professor of Comparative Medicine and Veterinarian to the Experiment Station, 1900—.

JOHN DAVISON LAWSON, B. C. L., LL. D.,

Professor of Law.

B. C. L., Trinity College, 1875; LL. D., University of Missouri, 1892; Editor *Central Law Journal*, St. Louis, 1876-81; Practiced Law in St. Louis, 1876-85; Judge of Civil Court, New Jersey, 1886-91; Professor of Law, University of the State of Missouri, 1891—.

JOHN PICKARD, A. B., Ph. D.,

Professor of Classical Archaeology and History of Art.

A. B., Dartmouth College, 1883; A. M., 1886; Student at the University of Leipzig, 1889; University of Berlin, 1890, 1895; in the American School of Classical Studies at Athens, 1890-1; at University of Munich, 1891-2; Ph. D., University of Munich, 1892; Professor of Classical Archaeology, University of the State of Missouri, 1892—.

FRANK THILLY, A. B., Ph. D.,

Professor of Philosophy.

A. B., University of Cincinnati, 1887; Student at the University of Berlin, 1887-9; Student at the University of Heidelberg, 1889-91; A. M., Ph. D., University of Heidelberg, 1891; Fellow in Philosophy, Cornell University, 1891-2; Instructor in Logic and the History of Philosophy, Cornell University, 1892-3; Professor of Philosophy in the University of the State of Missouri, 1893—.

LUTHER MARION DEFOE, A. B.,

Assistant Professor of Mathematics.

Teaching Fellow in Mathematics, University of the State of Missouri, 1891-2; A. B., Harvard University, 1893; Acting Professor of Mathematics, University of the State of Missouri, 1893-4; Assistant Professor of Mathematics, 1894-7; Acting Professor of Mathematics, 1897-8; Assistant Professor of Mathematics, 1898—.

JOHN CHARLES WHITTEN, B. S., M. S.,

Professor of Horticulture and Horticulturist to the Experiment Station.

B. S., South Dakota Agricultural College, 1891; M. S., 1899; Instructor in Horticulture and Horticulturist to the Experiment Station, South Dakota Agricultural College, 1892; Student at Cornell University, 1892; Assistant in Horticulture, Missouri Botanical Garden, 1893-4; Professor of Horticulture and Horticulturist to the Experiment Station, University of the State of Missouri, 1894—.

SIDNEY CALVERT, B. Sc., A. M.,

Assistant Professor of Chemistry.

B. Sc., McGill University, 1890; Graduate Student, Harvard University, 1890-4; A. M., 1892; Assistant in Chemistry, Harvard University, 1892-4; Private Research Assistant, 1892-4; Assistant Professor of Chemistry, University of the State of Missouri, 1894—.

HENRY JACKSON WATERS, B. S. A.,

Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station.

B. S. A., University of the State of Missouri, 1886; Assistant Secretary, Missouri State Board of Agriculture, 1886-8; Assistant in Agriculture to the Missouri Experiment Station, 1888-91; Professor of Agriculture in the Pennsylvania State College and Agriculturist to the Experiment Station, 1892-5; Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station, University of the State of Missouri, 1895—.

ISIDOR LOEB, M. S., LL. B., Ph. D.,

Professor of History and Administration.

B. S., University of the State of Missouri, 1887; M. S., LL. B., 1893; Tutor in History, 1892-4; University Fellow in Jurisprudence in Columbia University, 1894-5; Assistant Professor of History, University of the State of Missouri, 1895-9; Student at the University of Berlin, 1899-1900; Professor of History, University of the State of Missouri, 1899-1901; Ph. D., Columbia University, 1901; Professor of History and Administration, University of the State of Missouri, 1901—.

BENJAMIN FRANKLIN HOFFMAN, B. L., M. L.,

Professor of Germanic Languages.

B. L., University of the State of Missouri, 1884; M. L., 1888; Assistant Professor of Modern Languages, University of the State of Missouri, 1887-92; Student in Paris and Munich, 1892-3; Professor of Modern Languages, University of Louisiana, 1893-5; Student at the University of Chicago, Summer Session, 1895, 1896; Professor of Germanic Languages, University of the State of Missouri, 1895—.

FREDERICK BLACKMAR MUMFORD, M. S.,

Professor of Agriculture.

B. S., Michigan Agricultural College, 1891; M. S., 1893; Assistant in Michigan Agricultural Experiment Station, 1891-5; Assistant Professor of Agriculture, Michigan Agricultural College, 1893-5; Professor of Agriculture, University of the State of Missouri, 1895—.

HENRY MARVIN BELDEN, A. B., Ph. D.,

Assistant Professor of English.

A. B., Trinity College, 1888; Ph. D., Johns Hopkins University, 1895; Instructor in English, Lehigh University, 1890-1, University of Nebraska, 1893-4; Student University of Strassburg, 1894-5; Assistant Professor of English, University of the State of Missouri, 1895—.

JOHN MOORE STEDMAN, B. Sc.,

Professor of Entomology and Entomologist to the Experiment Station.

B. Sc., Cornell University, 1888; Instructor in Invertebrate Zoology and Entomology, Cornell University, and Entomologist to the Experiment Station, 1888-90; Biologist to the United States Department of Agriculture, 1890-1; Professor of Biology, Trinity College, 1891-3; Professor of Biology, Alabama Polytechnic Institute, Agricultural and Mechanical College, and Biologist to the Experiment Station, 1893-5; Professor of Entomology, University of the State of Missouri, and Entomologist to the Experiment Station, 1895—.

RAYMOND WEEKS, A. B., Ph. D.,

Professor of Romance Languages.

A. B., Harvard University, 1890; A. M., 1891; Instructor in French, University of Michigan, 1891-3; Travelling Fellow to Harvard University (Paris and Berlin), 1893-5; Ph. D., Harvard, 1897; Professor of Romance Languages, University of the State of Missouri, 1895—.

WILLIAM GEORGE BROWN, B. S., Ph. D.,

Professor of Chemistry.

B. S., University of Virginia, 1877; Professor of Chemistry, University of Tennessee, 1877-83; Student in Heidelberg, 1880-1; Instructor in Chemistry, University of Virginia, 1883-5; Morgan Fellow, Harvard University, 1891; Professor of Chemistry and Physics, South Carolina Military Academy, 1895-6; Professor of Chemistry, Washington and Lee University, 1896-94; Ph. D. (Hon.), University of North Carolina, 1889; Assistant Chemist, U. S. Department of Agriculture, 1894-6; Professor of Chemistry, University of the State of Missouri, 1896—.

JOHN RUTLEDGE SCOTT, A. B., A. M.,

Professor of Elocution.

A. B., Ohio University, 1864; A. M., 1867; Instructor in Elocution, Washington University, 1877-88; Instructor in Vocal Culture, Johns Hopkins University, 1893-7; Professor of Elocution, University of the State of Missouri, 1897—.

HOWARD BURTON SHAW, B. C. E., A. M.,

Professor of Electrical Engineering.

A. B., University of North Carolina, 1890; B. C. E., 1891; Instructor in Mathematics, University of North Carolina, 1889-90, and Instructor in Mathematics, Surveying and Drawing, 1891-3; In Engineering Work with Phoenix Iron Company, 1892; A. M., Harvard University, 1894; Assistant in Electrical Engineering Laboratory, Lawrence Scientific School, Harvard University, 1894-6; In Engineering Work with Consolidated Traction Company, 1896; Assistant Professor of Electrical Engineering, University of the State of Missouri, 1896-9; Professor of Electrical Engineering 1899—.

CURTIS FLETCHER MARBUT, B. S., A. M.,

Professor of Geology and Mineralogy.

B. S., University of the State of Missouri, 1889; Student at Harvard University, 1893-5; A. M., Harvard University, 1894; Instructor in Geology and Mineralogy, University of the State of Missouri, 1895-7; Assistant Professor of Geology and Mineralogy, 1897-99; Studied in Europe, 1899-1900; Professor of Geology and Mineralogy, University of the State of Missouri, 1899—.

JOHN NELSON FELLOWS, A. M.,

Professor of Mathematics.

B. S., University of the State of Missouri, 1892; M. S., 1893; Student in Harvard University, 1893-5; A. M., Harvard University, 1894; Student in University of Goettingen, 1895-6; Professor of Mathematics and Physics, Peekskill Military College, 1896-8; Professor of Mathematics, University of the State of Missouri, 1898—.

PAUL KAUFMANN, M. D.,

Professor of Bacteriology and Pathology.

Student at University of Berlin, 1883-4; University of Zurich, 1884; Received State Diploma as Physician from University of Strassburg, 1889;

M. D., University of Strassburg, 1890; Pathological Assistant, Senckenberg's Institute, Frankfurt, 1891; Professor of Pathology and Bacteriology in Medical School, Cairo (Egypt), 1892-3; Bacteriological Surveyor, Cairo Water Company, 1894-5; Director of Private Laboratory in Berlin, 1896-8; Professor of Bacteriology and Pathology, University of the State of Missouri, 1898—.

JOSEPH MARTIN WHITE, A. B.,

Professor of Pedagogy.

Graduate of Kirksville Normal School, 1874; Superintendent of the Louisiana (Mo.) Schools, 1875-7; of the Carrollton Schools, 1878; A. B., Michigan University, 1881; Superintendent of the Carthage Schools, 1885-55; School Examiner for the University of the State of Missouri, 1897-9; Professor of Pedagogy, University of the State of Missouri, 1899—.

GEORGE LEFEVRE, A. B., Ph. D.,

Professor of Zoology.

A. B., Johns Hopkins University, 1891; Fellow, 1894-5; Bruce Fellow 1895-7; Ph. D., 1896; Assistant in Zoology and Embryology, Johns Hopkins University, 1897-8; Instructor in Zoology, Marine Biological Laboratory, Woods Holl, Mass., 1898-1900; Professor of Zoology, University of the State of Missouri, 1899—.

CLARENCE MARTIN JACKSON, B. S., M. S., M.D.,

Assistant Professor (in charge) of Anatomy and Histology.

B. S., University of the State of Missouri, 1898; M. S., 1899; M. D., 1900; Fellow in Biology, 1897-9; Assistant in Anatomy, 1899-1900; Assistant Professor of Anatomy and Histology, 1900—.

CHARLES BERRY NEWCOMER, A. B., Ph. D.,

Acting Assistant Professor of Latin Language and Literature.

A. B., University of Nebraska, 1889; M. A., 1890; Student at Berlin and Nancy, 1890-1; Professor of Greek and Latin, Corner University, 1891-3; Student at University of Berlin, 1895-9; Ph. D., University of Berlin, 1899; Acting Assistant Professor of Latin, University of the State of Missouri, 1899-1901.

†JAMES WILLIAM KYLE, A. B., A. M.,

Acting Professor of Greek Language and Literature.

A. B., Denison University, 1894; Professor of Latin, Grand Island College, Nebraska, 1894-6; Graduate Student, University of Chicago, 1897; Studied in Berlin, 1898; Student in the American School of Classical Studies at Athens, 1898-9; Graduate Student, University of Chicago, 1899-1900; A. M., University of Chicago, 1900.

CHARLES A. ELWOOD, Ph. B., Ph. D.,

Professor of Sociology.

Ph. B., Cornell University, 1896; Graduate Student, University of Chicago, 1896-7, 1898-9; Assistant in University of Berlin, 1897-8; Fellow in Sociology, University of Chicago, 1898-9; Ph. D., 1899; General Secretary of the Charity Organization Society of Lincoln, Nebraska, 1899-1900; Instructor in Sociology, University of Nebraska, 1899-1900; Professor of Sociology, University of the State of Missouri, 1900—.

CHARLES WILSON GREENE, A. B., Ph. D.,

Professor of Physiology and Pharmacology.

A. B., Leland Stanford Jr. University, 1892; A. M., 1893; Ph. D., Johns Hopkins University, 1898; Instructor in Zoology, Marine Biological Laboratory, Woods Holl, Mass., 1896, 1897; Fellow in Physiology, Johns Hopkins University, 1897-8; Assistant Professor of Physiology, Leland Stanford Jr. University, 1898-1900; Professor of Physiology and Pharmacology, University of the State of Missouri, 1900—.

†For the session of 1900-1901.

RALPH EMERSON BASSETT, A. B., A. M.,

Assistant Professor of Romance Languages.

A. B., Harvard University, 1889; A. M. 1890; Master in Modern Languages, Belmont School, Mass., 1890-2; Instructor in French and German, De Pauw University, 1892-3; Student of Romance Languages and Philology, Paris, 1893-4; Acting Professor of Modern Languages, College of Charleston, (S. C.), 1895-7; Instructor in Romance Languages, Syracuse University, (N. Y.), 1897-9; Instructor in Romance Languages, College for Women of Western Reserve University, 1899-1900; Assistant Professor of Romance Languages, University of the State of Missouri, 1900—.

MAX MEYER, Ph. D.,

Professor of Experimental Psychology.

University of Berlin, 1892-6; Ph. D., University of Berlin, 1896; Research Work, Psychological Laboratory, University of Berlin, 1896-8; Research Work, Clark University, 1899-1900; Professor of Experimental Psychology, University of the State of Missouri, 1900—.

CLARK WILSON HETHERINGTON, A. B.,

Professor of Physical Training and Director of Gymnasia and Athletics.

A. B., Leland Stanford, Jr., University, 1895; Instructor, Encina Gymnasium, Stanford University, 1893-6; Anthropologist and Director of Physical Training, Whittier State (Reform) School, 1896-8; Fellow in Physiology, Clark University, 1893-9; Fellow and Assistant in Physiology, Clark University, 1899-1900; Professor of Physical Training and Director of Gymnasia and Athletics, University of the State of Missouri, 1900—.

FREDERICK PUTNAM SPALDING, C. E.,

Professor of Civil Engineering.

C. E., Lehigh University, 1880; Member of Engineer Corps of the Southern Pacific Railway, 1880-82; Assistant Engineer, Mississippi River Improvements, 1882-6; Instructor in Civil Engineering, Lehigh University, 1886-8; Assistant Engineer, Mississippi River Improvements, 1888-90; Engineer in Charge of Street Extensions, Washington, D. C., 1890-1; Assistant Professor of Civil Engineering, Cornell University, 1891-8; Contracting Engineer, Bethlehem, Pa., 1898-1900; Professor of Civil Engineering, University of the State of Missouri, 1900—.

†HOWARD REMUS SMITH, B. S.,

Acting Professor of Agriculture.

B. S., Michigan Agricultural College, 1895; Graduate Student, University of Wisconsin, 1899-1900; Acting Professor of Agriculture, University of the State of Missouri, 1900-1901.

†PAUL BAUR, B. L., A. M., Ph. D.,

Acting Professor of Classical Archaeology and of the History of Art.

B. L., University of Cincinnati, 1894; Student of the University of Tuebingen, 1894-5; University of Berlin, 1895-7; in the American School of Classical Studies at Athens, 1897-9; at the University of Heidelberg, 1899-1900; A. M., Ph. D., University of Heidelberg, 1900; Lecturer on Classical Archaeology, University of Cincinnati, 1901

*

Professor of Economics.

CHARLES THOM, A. B., Ph. D.,

Acting Assistant Professor (in charge) of Botany.

A. B., Lake Forest University, 1895; A. M., 1897; Marine Biological Laboratory, 1897; Student Assistant in Biology, Lake Forest University, 1896-7; Instructor in Biology, University of the State of Missouri, 1897-9; Ph. D., University of the State of Missouri, 1899; Instructor (in charge) in Botany, University of the State of Missouri, 1900-1; Acting Assistant Professor (in charge) of Botany, University of the State of Missouri, 1901—.

*To be filled before the opening of the next session.

†For the session of 1900-1901.

‡For the session of 1901-1902.

1. ACADEMIC.

ADMISSION.

Graduates of either sex of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities, and (in exceptional cases, by special permission of the Faculty) other persons of liberal education, are admitted to such graduate work as they are prepared for. The credentials of candidates for admission to this Department will be passed upon by the Dean.

FELLOWSHIPS.

Fellowships are annually established where such additional teaching force is required. Holders of these Fellowships are required to teach five or six hours a week, and receive therefor \$200; and they are exempt from the payment of fees and deposits. For further details, see the general Catalogue.

During the year 1900-1901, Fellowships were held in Germanic Languages, Zoology, Mathematics, Physiology, English, Greek, History, Chemistry, Anatomy and Materia Medica.

GRADUATE CLUB.

A club has been organized by the graduate students for the purpose of furthering their social and scholastic interests in the University and of bringing themselves into touch with graduate student life elsewhere. This club has joined the Federation of Graduate Clubs of the leading American Universities, and the courses here offered are announced in the handbook published by the Federation.

DEGREES.

1. *The Master's Degree.*—Applications for the Master's Degree in Arts or Science will be considered on the basis of one year's graduate study in the University. This year's study is understood to mean for Fellows at least eight (8) hours a week, for other students at least ten (10) hours a week throughout the scholastic year, or the full equivalent of such study. All Courses may be taken from one general subject; at least half must be. The majority of the Courses must be graduate in character.

A creditable thesis evincing capacity for original research and power of independent thought, in the line of the student's previous work, shall be submitted on or before May 1 of the given year.

The subject of the thesis and the Courses chosen shall be laid before the Committee on Graduate Degrees on or before November 1 of each year.

At the close of the scholastic year the University Council may, on the report of this Committee, recommend to the Board of Curators for this degree such candidates as have satisfactorily fulfilled these conditions.

2. *The Master's Degree and Life Certificate.*—Candidates for the Master's Degree who wish the Life Certificate to teach in Missouri may obtain this in the following manner: In each semester they shall elect Senior Pedagogy, three (3) hours a week, as a portion of the ten (10) hours a week required for the Master's Degree. The remaining seven (7) hours required for this degree must be of a strictly graduate character. The candidate shall, in addition, elect Junior Pedagogy, three (3) hours a week for both semesters. On the satisfactory completion of these thirteen (13) hours a week for each semester the candidate may receive the Master's Degree and the life Certificate.

3. *The Doctor's Degree.*—The candidate will be expected to spend at least three years, or, if he have a Master's Degree, at least two years, in graduate study under University direction; but with the consent of the Faculty, one of these years may in either case be spent *in absentia*.

The candidate must have a Bachelor's Degree in Arts, Letters, Science, or Philosophy, from some reputable university or college, and must attain in graduate study at this University a high proficiency in one branch of learning, and a respectable proficiency in at least one other. He must submit a dissertation embodying the results of original investigation, and must pass examinations in his major and minor subjects.

Candidates who have satisfactorily met these conditions may be recommended for the Doctor's Degree in the manner prescribed above for candidates for the Master's Degree.

COURSES OF INSTRUCTION.

[Courses designated by a number with the letter a attached, thus: 4a, 6a, are given the first semester only. Those designated by a number with the letter b attached, thus: 4b, 6b, are given the second semester only. Those designated by a simple number are continuous Courses and are given both semesters.]

BOTANY.

Acting Assistant Professor THOM.

The following Courses are offered:

For Graduates.

10. Investigation. Botanical problems are assigned for training in methods of research. A thesis must be written at the completion of the work. Topics and hours to be arranged with the Instructor.

For Undergraduates and Graduates.

4. Cryptogamic Botany; a general course in the morphology and taxonomy of the lower plants. *M. W. F., at 8-10:30.*

5. Systematic Botany and Oecology. Hours to be arranged with the Instructor.

6. Economic Botany; the practical application of Botany with special reference to the needs of the student and teacher in economic lines; presupposes two years of botanical work. Hours to be arranged with the Instructor.

7. Botanical Seminary. The current literature of Botany will be carefully reviewed. *One hour.*

CHEMISTRY.

Professor BROWN; Assistant Professor CALVERT.

The following Courses are offered:

For Graduates.

14. Research. This will consist principally of original work and investigations in Inorganic, Organic and Physical Chemistry and will be adapted in some measure to individual cases. Professor BROWN and Assistant Professor CALVERT.

This Course may be taken by Undergraduates of special attainments.

For Undergraduates and Graduates.

4. Organic Chemistry. Lectures, laboratory work, and recitations. *Three hours a week.* Assistant Professor CALVERT.

8b. Chemical Theory. Lectures and recitations. *Three hours a week.* Professor BROWN.

9a. History of Chemistry. Lectures and recitations. *Three hours a week.* Professor BROWN.

10b. Physical Chemistry. Lectures, laboratory work and recitations. Professor BROWN.

The hours of all Courses are to be arranged with the Instructor.

CLASSICAL ARCHAEOLOGY.

*Professor PICKARD; Acting Professor BAUR.

The following Courses are offered:

For Graduates.

14. Topography and Monuments of Athens, based on a careful study of Pausanias. *T. Th., at 8:30.*

15. Archaeological Seminary. Interpretation of monuments and discussion of disputed points in the history of art and artists.

For Undergraduates and Graduates.

6. History of Greek Art. An introductory study of Assyrian and of Egyptian art, followed by a special study of the development of Greek architecture and sculpture from the VII century B. C., to the I century A. D. *T. Th. S., at 2.*

*Absent during the session 1901-1902.

7. "Mycenaean Art," or Art of Primitive Greece. Lectures based on the latest excavations and publications. *M.*, at 2.

8b. Introductory Study of Greek Vases and Vase Paintings; based on Rayet and Collignon's *La Ceramique Grecque*. *M.*, at 2.

9. Etruscan and Graeco-Roman Art. *M. W.*, at 9:30. Study of Etruscan Art is based on Martha, *L'Art Etrusque*. Study of Graeco-Roman Art is carried down to Byzantine times.

10a. Roman Life. A special study of the extant remains, particularly in Rome and Pompeii. No knowledge of Latin required. *T. Th.*, at 11:30.

11. History of Renaissance Painting. *First semester*, Painting of the Netherlands and of Germany; *second semester*, Italian Painting. *T. Th. S.*, at 4.

12. History of Architecture. *M. W. F.*, at 11:30.

Course 14 alone requires a knowledge of Greek.

MUSEUM OF CLASSICAL ARCHAEOLOGY.

An excellent beginning has been made in equipping a laboratory for the study of Classical Archaeology. For this purpose the third floor of the west wing of Academic Hall, a room 110x36 feet, is fitted up. It is now supplied with models of temples, illustrating the three orders of Greek architecture, and with fifty plaster casts of the most famous specimens of Greek and Roman art. These are arranged chronologically, and with them are hung one hundred and fifty framed photographs of other works of classic art. Besides these, the Museum possesses about a thousand photographs, and a fine collection of lantern slides.

RENAISSANCE PAINTING.

To illustrate the Course in Renaissance Painting, a large number of carbon photographs of the masterpieces of Flemish, Dutch, German and Italian painting have been framed and hung in the gallery near the Museum of Classical Archaeology.

ECONOMICS.

Professor ———.

[This Chair will be filled and additional Courses announced in full time for the opening of the next session.]

The following Courses are offered:

For Graduates.

3. Seminary in Economics and Finance. An opportunity is here given for the advanced study of questions of economics and finance.

For Undergraduates and Graduates.

2. Economic Problems. A critical study of some of the leading economic problems: Socialism, problems of labor, money, transportation and the tariff. *Three hours a week.*

ENGLISH.

Professor ALLEN; Assistant Professors PENN and BELDEN.

The following Courses are offered:

For Graduates.

9. English Literature. Tennyson and Browning. Readings, class-room study and interpretation of texts, and occasional papers by members of the class. *W. F., at 10:30.*

15. Studies in Anglo-Saxon, based on Beowulf and the Wuelker-Grein Bibliothek. *T. Th. S., at 3.*

16. Gothic. Introduction to Germanic Philology, with special reference to English. *M. W. F., at 3.*

For Undergraduates and Graduates.

7. English Literature. Shakspeare. Eight to ten selected plays: class-room reading and interpretation; detailed study of style. *M. W. F., at 3.*

8. English Literature. The English Drama. *First semester:* Chief Plays of Shakspeare, in approximate chronological order. A study of the development of Shakspeare's art and genius. *Second semester:* The English Drama (exclusive of Shakspeare) from its beginnings to the Restoration (1250-1660). Lectures. Selected plays, and reports; occasional essays. *W. F., at 10.*

12. Anglo-Saxon. Prose and Poetry. *M. W. F., at 11:30.*

Courses 8 and 9 are given only in alternate years.

EXPERIMENTAL PSYCHOLOGY.

Professor MEYER.

The following Courses are offered:

For Graduates.

7. Psychological Seminary and Advanced Laboratory Work. Critical reading of recent literature. Discussion of special problems and theories. Research work.

For Undergraduates and Graduates.

4a, b. Aesthetics. Psychological theory of Art. *T. Th. S., at 4.*

In this Course the aesthetic sentiments aroused in man by the beautiful in nature, in the arts of architecture, painting, sculpture, music, poetry and in the theatrical arts are analyzed.

The Course will be given in two parts. In the first semester will be discussed art in auditory sensations, especially music (4a); in the second semester, art in visual sensations (4b). Either one of these parts may be taken alone.

5a. Advanced Psychology. *M. W. F., at 8:30.* Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. This Course is open to students who have had a course in Psychology.

6. Mental Development in the Child and the Race. Experimental methods of Child Study. Dawning intelligence during animal infancy. Experiments upon the mental processes of animals. Instinct and psychical heredity. Theories of mental evolution. This is an advanced Course, open only to students who have taken the introductory Course in Psychology.

GEOLOGY AND MINERALOGY.

Professor MARBUT.

Graduate work in Geology may be pursued along either the geographical or the purely geological side of the subject and facilities are offered for the pursuit of either side both in the field and in the laboratory.

The following Courses are offered:

For Graduates.

10. Experimental Geology. Facilities will be offered for making experiments in erosion and in the deformation of rocks.

For Undergraduates and Graduates.

8. Geomorphology. Special field and laboratory study of land form and geographical development. Laboratory work will include the correlation of forms studied in the field with similar forms elsewhere and the production of contour maps and relief models.

9. Field Geology. The detailed study, with the preparation of reports and maps, of geologically important districts. The selection of the area to be studied may be made by the student, with the approval of the Professor, from localities within convenient reach.

Hours of all courses to be arranged with the Instructor.

GERMANIC LANGUAGES.

Professor HOFFMAN.

The following Courses are offered:

For Graduates.

7. German Literature of the Eighteenth and Nineteenth Centuries. *T. Th. S., at 2.*

8. Middle High German. *M. W. F., at 11:30.*

Grammar, reading from Hartmann von Aue's *Der Arme Heinrich* and from *Das Niebelungenlied*, translating into good modern High German and noting changes in construction, phraseology, and meaning of words; lectures on the literature of the period.

9a. Historical German Grammar. *T. Th. S., at 3.*

10b. Old High German. *T. Th. S., at 3.* Braune's *Grammatik* and *Lesebuch*; reading from Tatian, Otfried, Notker, Williram's *Lied*; philological study in connection with it.

For Undergraduates and Graduates.

3. Schiller's Dramas and Ballads. Composition; lectures on Schiller's life and works. *T. Th. S., at 10:30.*

4. Goethe's Dramas and Ballads. Lectures on his life and works; German essays. *M. W. F., at 9:30.*

5a. Lessing as a Critic. Lectures on his dramas. *T. Th. S., at 9:30.*

5b. Poetry of the Nineteenth Century. *T. Th. S., at 9:30.*

All these Courses, except Course 3, will be conducted wholly in German, and will require, therefore, a knowledge of spoken German.

GREEK.

Professor MANLY.

The following Courses are offered:

For Graduates.

13. Historical Greek Grammar. *Two hours a week.*

14. Seminary. Selected tragedies of Euripides will be read and analyzed carefully. Each student will be given definite topics for investigation and report from time to time, discussing Euripides as a literary artist, poet, philosopher, and man of his own times, as revealed in his plays. *Two hours a week.* Hours to be arranged with the Instructor.

For Undergraduates and Graduates.

10. Greek Life. Manners and customs of the ancient Greeks. Lectures illustrated by maps, charts and stereopticon views. *W. F., at 2.*

HISTORY AND ADMINISTRATION.

Professor LOEB; Dr. DREWRY.

The following Courses are offered:

For Graduates.

9. Seminary in History and Administration. A Course of training in research. Subjects assigned for investigation during the year 1901-1902 will be in Missouri history and administration. *May be elected for 2, 3, or 4 hours.*

For Undergraduates and Graduates.

6. Theory of Politics and Jurisprudence. *First Semester.* Theory of Politics. An historical and critical study of the theories of the nature and origin of the State and an analysis of rights and sovereignty. *Second Semester.* Theory of Jurisprudence. This Course treats of the nature, sources, and classification of law and includes a consideration of the general principles of private law. *T. Th. S., at 3.*

7. Comparative Constitutional Law. A comparative study of the constitutional law of the principal states of Europe and America. The Course includes a consideration of the formation of the principal constitutions. *M. W. F., at 3.*

8. Comparative Administrative Law. A study of the nature and function of the administration and its relation to the legislative and judicial departments. Governmental structure will be studied in detail and local government will be considered with reference to recent developments. *M. W. F., at 11:30.*

LATIN

Professor JONES; *Assistant Professor JOHNSTON; Acting Assistant Professor NEWCOMER.

The following Courses are offered:

For Graduates.

14. History of the Latin Language. *M. W. F., at 10:30.*

This Course embraces an historical study of the sounds, inflections and syntax of Latin. It is taught wholly by lectures, but requires much collateral reading. Professor JONES.

15. Seminary. The object of the Seminary is to familiarize its members with the methods of independent investigation. The work for 1901-1902 will consist of exegetical study of the Aeneid. *Three hours a week.* Hour to be arranged. Acting Assistant Professor NEWCOMER.

For Undergraduates and Graduates.

9. Roman Drama (Plautus and Terence). *T. Th. S., at 3.*

In this Course particular attention will be given to the early forms, construction, and metres. Considerable attention will also be paid to the development of Latin Comedy. Acting Assistant Professor NEWCOMER.

11. Latin Literature. *T. Th. S., at 11:30.*

This Course includes reading of characteristic selections with the view of presenting the historical development of Latin Literature. Professor JONES.

13. Advanced Latin Composition. *T. Th., at 8:30.* Acting Assistant Professor NEWCOMER.

MATHEMATICS.

Professor FELLOWS; Assistant Professor DEFOE.

For Graduates.

11. Spherical Harmonics and Potential Function *M. W. F., at 10:30.* Professor FELLOWS.

12. Theory of Functions (Introductory Course). *T. Th. S., at 4.* Assistant Professor DEFOE.

13. Theory of Functions (Second Course). *M. W. F., at 3.* Professor FELLOWS.

For Undergraduates and Graduates.

5. Differential and Integral Calculus. *T. Th. S., at 9:30.* Assistant Professor DEFOE.

*Absent during the session of 1900-1901.

Text: Byerly's Integral Calculus.

6. Theory of Equations and Determinants. Introduction to the Theory of Invariants. *M. W. F.*, at 9:30. Professor FELLOWS.

Text: Burnside and Panton's Theory of Equations.

7a. Infinite Series and Products. *M. W. F.*, at 8:30. Professor FELLOWS.

7b. Solid Analytic Geometry. *M. W. F.*, at 8:30. Professor FELLOWS.

Text: Smith's Solid Geometry.

8. Advanced Analytic Geometry. *M. W. F.*, at 11:30. Professor FELLOWS.

Text: Salmon's Conic Sections.

9. Advanced Mechanics. Dynamics of a Rigid Body. *M. W. F.*, at 4. Assistant Professor DEFOE.

10. Differential Equations. *T. h. TS.*, at 8:30. Professor FELLOWS.

PHILOSOPHY.

Professor THILLY.

The following Courses are offered:

For Graduates.

6. Kant's Kritik of Pure Reason. *M. W. F.*, at 11:30.

A careful study will be made of Kant's fundamental work and of the problems suggested by the same. Only such students will be admitted to this Course as have had adequate training in Logic, Psychology, and the History of Philosophy and possess a reading knowledge of German.

For Undergraduates and Graduates.

4. History of Ancient and Mediaeval Philosophy. *T. Th. S.*, at 10:30. The development of thought will be traced from early Greek times down to the Renaissance. The following topics will be discussed: Greek and Roman Philosophy; The Jewish Religion; Primitive Christianity; Gnosticism; The Patristic Period; Scholasticism and Mysticism.

4. History of Modern Philosophy. *T. Th. S.* at 8:30. From the Renaissance down to the present. Emphasis will be placed on the following movements: The Renaissance; The Reformation; The Rationalistic Systems as represented by Descartes, Spinoza, Leibniz and Wolff; the Empiristic Systems as represented by Bacon, Hobbes, Locke, Berkeley, and Hume; the Critical Philosophy of Kant; Fichte, Schelling, and Hegel; Herbart and Schopenhauer; Positivism; the Philosophy of Evolution; Lotze, Fechner, and Hartmann.

5. Advanced Logic. *M. W. F.*, at 9:30. A study of the foundations, methods, and aims of knowledge, based upon Sigwart's Logic. The doctrine of Judgment, Concept, and Inference, and Methodology.

PHYSICS.

Professor LIPSCOMB.

The following Courses are offered:

For Graduates.

8a. The Theory and Practice of Spectroscopy. In this course special attention is given to mapping the spectra, and to the effect of the density and the temperature of the gas on the spectrum. *Two hours a week.*

9b. The History of Physics. *Two hours a week.*

10. Advanced Measurements and Research Work, *Two to five hours a week.*

For Undergraduates and Graduates.

5a. The Theory of Heat. *Three hours a week.*

5b. The Theory of Light. *Three hours a week.*

The basis of the work in Courses 5a and 5b is that given by Preston in his *Theory of Heat* and *Theory of Light*.

6, 6a, or 6b. Advanced Experimental Work in Heat, Light and Electricity. *Two to five hours a week.*

6b. Mathematical Theory of Electricity and Magnetism. *Three hours a week.*

Hours of all Courses to be arranged with the Instructor.

PHYSIOLOGY.

Professor GREENE.

The following Courses are offered:

For Graduates.

7. Investigation.

Opportunity is here offered for research into questions of current physiological interest. Problems will be assigned according to the individual needs of the student. Time to be arranged.

8. Physiological Seminary and Journal Club. *One hour. T., at 7:30 p. m.*

For Undergraduates and Graduates.

4a. General Physiology.

The principles of Physiology illustrated by the simpler forms of life. *Two hours. Lecture F., at 8:30. Laboratory F. at 9:30--12:00.*

5b. Pharmacology.

This Course presents the physiological action of chemicals. The laboratory experiments are distributed to groups of students and each group is required to demonstrate to other members of the Course. *Two hours. Lecture F., at 8:30. Laboratory F., at 9:30-12:00.*

6. Advanced Physiology.

Special Course open to students who have completed 3 and 4a. Throughout the year. Hours to be arranged.

ROMANCE LANGUAGES.

Professor WEEKS; Assistant Professor BASSETT.

The following Courses are offered:

For Graduates.

11. The Sixteenth Century. Lectures, readings and reports. *T. Th. S.*, at 2.

The Course includes the period between the close of the literature of the Middle Ages and the first years of the seventeenth century, with especial attention to the intellectual forces set in motion by the Renaissance and Reformation in France. Some knowledge of the political history of the period will be indispensable. The first semester will be given to a general survey of the period in question through a study of extracts from its leading writers. The second semester will deal chiefly with Montaigne, (*Essais*), and Rabelais, (*Gargantua-Pantagruel*), making a careful study of selected portions of their works. Assistant Professor BASSETT.

The books needed by the student will be, first semester, Darmesteter et Hatzfeld, *Le Seizieme Siecle en France*; second semester, works of Montaigne and Rabelais, Firmin-Didot, Paris, 2 vols., each.

12. Old French. Paris and Langlois' *Chrestomathie*, with lectures. *M. W. F.*, at 10:30. This Course is open to Graduates properly qualified, and to any Senior who has made a specialty of Romance Languages to the extent of having completed with high credit Undergraduate Courses 1, 2, 4 and 6 (see Academic Department in the General Catalogue, Romance Languages). The epic poem, *Aliscans*, will be read, with close attention to the elements that enter into the poem, the object being to present to the student a practical illustration of text criticism. Professor WEEKS.

20a. Phonetics. A general introduction to philology. *M. W. F.*, at 2. This Course is one of general interest to students of philology. The work consists of two parts, historical and practical. The practical work includes an effort to get at the production of speech-sounds from the physiological standpoint. Such works as Grandgent's *English and German Sounds* (Ginn & Co.) are used. Numerous tracings showing the actions of the organs of speech are discussed. The University has established a Laboratory of Experimental Phonetics for the more accurate study of the living speech. Professor WEEKS.

21. Seminary. *Two hours a week.* Opportunity will here be given from time to time for advanced work in various subjects which may seem desirable. Professor WEEKS.

For Undergraduates and Graduates.

10. The Seventeenth Century. An attempt is made in this Course to obtain a general view of the Classic Period. Particular attention will of course be paid to the social and political conditions in France in the seventeenth century.

Selections from the works of most of the following authors will be read: Regnier, Rotrou, Corneille, Racine, Cyrano de Bergerac, Moliere, Pascal

Bossuet, La Fontaine, La Rochefoucauld, Mme. de Sevigne, La Bruyere, Professor WEEKS.

A collection of critical works is to be found in the French library, such as various volumes of Sainte-Beuve, Lotheissen, *Geschichte der Franzosischen Litteratur im XVII Jahrhundert*; Petit de Julleville, *Histoire de la Langue et de la Litterature Francaise*, volumes IV and V.

16. Dante and the Sixteenth Century in Italy. *T. Th. S.*, at 9:30.

Open to Seniors and Graduates who have had at least two years of French, and who possess a fluent reading knowledge of modern Italian. The purpose of the Course is to take as comprehensive a view as is practicable of the classical literature of Italy. The works studied will be mostly verse, but outside prose reading will be expected. During the first semester Machiavelli's *Il Principe*, Tasso's *Gerusalemme Liberata*, and portions of Ariosto's *Orlando Furioso* will be read. The second semester will be devoted mainly to the study of Dante and the *Divina Commedia* (Ed. Scartazzini, 1 vol., Hoepli, Milan). Assistant Professor BASSETT.

SOCIOLOGY,

Professor ELWOOD.

The following Courses are offered:

For Graduates.

4b. Race Psychology. A study of the comparative psychology of races with special reference to primitive social organization. *T. Th. S.*, at 2.

5a. Sociology of Religion. A study of religious phenomena from the point of view of social philosophy. *T. Th. S.*, at 11:30.

7. Seminary. Critical study of either Spencer's *Principles of Sociology* or Ward's *Dynamic Sociology*. *Two hours credit.*

For Undergraduates and Graduates.

4a. Ethnology. A study of the problems of race in their relation to culture, civilization and social organization. *T. Th. S.*, at 9:30.

5b. Social Psychology. A study of the writings of Tarde, Le Bon, and Baldwin, with some attempt to make use of psychological principles in the interpretation of social phenomena. *T. Th. S.*, at 9:30.

6b. History of Social Philosophy. The development of social thought from Aristotle to the present. *M. W. F.*, at 2.

ZOOLOGY.

Professor LEFEVRE.

The following Courses are offered:

For Graduates.

8. Research. Special investigation of unsolved problems of Zoology in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is necessary.

Hours will be arranged in accordance with the requirements of individual students.

9. Seminary. Meetings at which special subjects of zoological investigation are reported and discussed by instructors and students. Each student is required to give at least six lectures during the year, and experience is thus gained in presenting, in the form of lectures, the results of reading and research.

A reading knowledge of French and German is required. *Twice a week.* Hours to be arranged.

For Undergraduates and Graduates.

6. Cytology. A study of the cell, with special reference to problems of development and inheritance. Lecture, *F. at 9:30*; Laboratory, *M. W., at 9:30.*

7b. Principles of Zoology. A course of lectures designed to cover the main principles underlying zoological science. Collateral reading in the writings of Darwin, Huxley, Spencer, Romanes, Galton, Weismann, Hertwig, Brooks, and others. *W. F. at 11:30.*



II. COLLEGE OF AGRICULTURE AND MECHANICAL ARTS.

SCHOOL OF AGRICULTURE.

Candidates for the degree of Master of Science in Agriculture are required to do one year's graduate work at the University. This work must consist of at least 10 hours a week throughout the year and the subjects selected must be advanced Courses, and must be approved by the Dean and the Committee on Graduate Degrees.

SCHOOL OF ENGINEERING.

Graduate work in Civil, Electrical, and Mechanical Engineering is offered at Columbia to those who have finished the Undergraduate Courses in these subjects respectively with the degree of Bachelor of Science. Students that entering under these conditions have completed a year of graduate work and passed satisfactory examinations thereon, and presented a thesis of real merit, will receive, according to the Course in which they have studied, the degree of Civil Engineer (C. E.), Electrical Engineer (E. E.), or Mechanical Engineering (M. E.). Graduate work in Hydraulic Engineering is offered to those who have completed the work in Civil and Mechanical Engineering.

The thesis subject shall be presented to the Committee on Graduate Degrees on or before November 1, and the thesis shall be presented to the same Committee on or before May 1, of the given year.

III. LAW.

One year of advanced work leading to the degree of LL. M.

The course is open to Graduates of the Law Department and of other law schools who have completed an equivalent course of study.

The object of this course is to provide the practitioner with a more extended knowledge of important subjects embraced in modern law or cognate thereto than the limited time of the Undergraduate Course permits. It is also intended to afford him assistance in prosecuting the study of any particular subject or branch of law which he expects to follow in his future practice.

The course of instruction embraces lectures, recitations and independent investigation on the following subjects:

Constitutional Law, Corporations, Insurance, Trusts, Patents, Copyrights, Law of Homicide, Theory of Jurisprudence, Practice, Parliamentary Law.

The student is allowed to select any special subject in law for extended examination, to be prosecuted concurrently with elected subjects embraced in the Course. His investigations are directed by the Faculty, who advise him of the books and cases to consult, and afford him assistance and counsel.

It is believed that many licensed attorneys will find it to their advantage to take as special students such instruction.

The text-books recommended for the Graduate Course are as follows:

Cooley on Constitutional Limitations; Lewin on Trusts; May on Insurance; Walker on Patents; Bishop on Criminal Law; Thompson on Corporations; Holland and Pollock on Theory of Jurisprudence; Pattison's Forms; Cushing's Parliamentary Law.

A thesis subject shall be selected and presented to the Committee on Graduate Degrees on or before November 1. The thesis shall be submitted to the same Committee on or before May 1, of the given year.

FEES AND EXPENSES.

The fee is \$5.00 for a session or any part thereof. This applies to all Departments of the University. Students taking laboratory work must make small laboratory deposits. Room rent, table board, fuel and lights cost from \$2.00 to \$4.50 a week. In the Clubhouses of the University the cost does not exceed \$2.00 a week.

For further information, address

IRVIN SWITZLER,

Registrar,

Columbia, Mo.

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UNIVERSITY OF MISSOURI

ANNOUNCEMENT

OF THE

GRADUATE DEPARTMENT

1902-1903

UNIVERSITY OF ILLINOIS

PRESIDENT'S OFFICE

COLUMBIA, MISSOURI



PRESS OF E. W. STEPHENS.
COLUMBIA, MO.

GRADUATE DEPARTMENT

Faculty

RICHARD HENRY JESSE, LL. D.,

President, and Professor of Ancient and Mediæval History.

Student at the University of Virginia, 1873-5 and part of 1878; Dean of the Academic Department, University of Louisiana, 1878-84; Professor of Latin, Tulane University, 1884-91; studied in Europe part of 1885 and 1890; LL. D., Tulane University, 1891; President of the University of Missouri, 1891—.

***PAUL SCHWEITZER, Ph. D., LL. D.,**

Professor of Agricultural Chemistry, and Chemist to the Experiment Station.

Student under Schneider, Sonnenschein and H. Rose at Berlin, 1858-60; Chemist to the Soda Ash Works, Schoeningen, 1860-2; Chemist to the Chemical Works at Detmold, 1862-3; Assistant Professor of Chemistry, Polytechnic Institute, Philadelphia, 1864-6; Assistant in School of Mines, Columbia College, 1866-72; Ph. D., University of Goettingen, 1869; LL. D., University of Missouri, 1897; Professor in the University of Missouri, 1872—.

ANDREW WALKER McALESTER, A. B., M. D., LL. D.,

Professor of Surgery, and Superintendent of the Parker Memorial Hospital.

A. B., University of Missouri, 1865, M. D., 1866, A. M., 1868, LL. D., 1897; studied abroad, 1873 and 1885; Professor of Surgery, University of Missouri, 1873, Dean of the Medical Faculty, 1880—.

WOODSON MOSS, M. D., LL. D.,

Professor of the Practice of Medicine.

M. D., University of Missouri, 1874, LL. D., 1901; Instructor in Medicine and Demonstrator of Anatomy, University of Missouri, 1875-8; Professor of Anatomy and Demonstrator, 1878-83; Professor of Anatomy and Physiology, 1883-91; studied in Europe, 1890; Professor of Anatomy and the Practice of Medicine, 1891-1900; Professor of the Practice of Medicine, 1900—.

JOHN CARLETON JONES, A. B., Ph. D.,

Professor of Latin Language and Literature.

A. B., Westminster College, 1879, A. M., 1882, Ph. D., 1891; Professor of Latin, Westminster College, 1880-2; Graduate Student at Johns Hopkins University, 1882-3; Assistant Professor of Latin and Greek, University of Missouri, 1883-7; Associate Professor of Latin, 1887-91;

*Absent during session of 1902-3. Substitute will be appointed before the opening of the session.

Student at the University of Leipzig and at Rome, 1895-6; Professor of Latin, University of Missouri, 1891—; Dean of the Academic Faculty, 1900—.

EDWARD ARCHIBALD ALLEN, Litt. D.,

Professor of English Language and Literature.

Student at Randolph-Macon College, 1861-2; Student at the University of Virginia, 1866-8; Professor of Latin and Greek, Farmville College (Va.), 1873-81; Professor of English and Modern Languages, Central College, 1881-5; Litt. D., Washington and Lee University, 1890; Professor of English, University of Missouri, 1885—.

*HENRY CAPLES PENN, A. B., A. M.,

Assistant Professor of English Language and Literature.

A. B., Central College, 1885; Instructor in Latin, Greek, and English, Hendrix College (Arkansas), 1885-7; Student at Harvard University, 1892-4; A. M., Harvard University, 1893; Assistant Professor of English, University of Missouri, 1887—.

JAMES AULL YANTIS, LL. B.,

Professor of Law.

LL. B., University of Missouri, 1875; Professor of Law, 1887—.

MILLARD LEWIS LIPSCOMB, A. M.,

Professor of Physics.

A. M., Bethany College (West Va.), 1874; Instructor in William and Mary College, 1874-5; Professor in William and Mary College, 1875; Professor of Physical Science, South Kentucky College, 1879-89; Professor of Physics, University of Missouri, 1889—.

ALEXANDER MARTIN, A. B., LL. D.,

Professor of Law.

A. B., University of Michigan, 1855, A. M., 1858; LL. B., Harvard University, 1858; LL. D., University of Missouri, 1890; Professor of Law and Dean of the Law Faculty, 1889—.

WILLIAM GWATHMEY MANLY, A. M.,

Professor of Greek Language and Literature.

Student at the University of Virginia, 1882-4; Assistant Head Master, McCabe's University School, 1884-6; Professor of Greek, Mercer University, 1886-9; A. M., Harvard University, 1890; American School for Classical Studies at Athens, 1900-1; Professor of Greek, University of Missouri, 1890—.

*Absent during session of 1902-3. Substitute will be appointed before the opening of the session.

JOHN WALDO CONNAWAY, D. V. S., M. D.,

Professor of Comparative Medicine and Veterinarian to the Experiment Station.

M. D., University of Missouri, 1891; Student at Johns Hopkins University, 1894-5; Professor of Physiology, University of Missouri, 1891-7; Professor of Physiology and Veterinarian to the Experiment Station, 1897-1900; Professor of Comparative Medicine and Veterinarian to the Experiment Station, 1900—.

JOHN DAVISON LAWSON, B. C. L., LL. D.,

Professor of Law.

B. C. L., Trinity College, 1875; LL. D., University of Missouri, 1892; Editor *Central Law Journal*, St. Louis, 1876-81; practiced law in St. Louis, 1876-85; Judge of Civil Court, New Jersey, 1886-91; Professor of Law, University of Missouri, 1891—.

JOHN PICKARD, A. B., Ph. D.,

Professor of Classical Archæology and History of Art, and Curator of the Museum of Classical Archæology.

A. B., Dartmouth College, 1883, A. M., 1886; Student at the University of Leipzig, 1889, University of Berlin, 1890, 1895; in the American School of Classical Studies at Athens, 1890-1; at the University of Munich, 1891-2; Ph. D., University of Munich, 1892; Professor of Classical Archæology, University of Missouri, 1892—.

FRANK THILLY, A. B., Ph. D.,

Professor of Philosophy.

A. B., University of Cincinnati, 1887; Student at the University of Berlin, 1887-9; Student at the University of Heidelberg, 1889-91; A. M., Ph. D., University of Heidelberg, 1891; Fellow in Philosophy, Cornell University, 1891-2, Instructor in Logic and the History of Philosophy, 1892-3; Professor of Philosophy, University of Missouri, 1893—.

*LUTHER MARION DEFOE, A. B.,

Assistant Professor of Mathematics.

Teaching Fellow in Mathematics, University of Missouri, 1891-2; A. B., Harvard University, 1893; Acting Professor of Mathematics, University of Missouri, 1893-4, Assistant Professor of Mathematics, 1894-7, Acting Professor of Mathematics, 1897-8, Assistant Professor of Mathematics, 1898—.

JOHN CHARLES WHITTEN, B. S., M. S.,

Professor of Horticulture and Horticulturist to the Experiment Station.

B. S., South Dakota Agricultural College, 1891, M. S., 1899; Instructor in Horticulture and Horticulturist to the Experiment Station, South

*Absent during session of 1902-3.

Dakota Agricultural College, 1892; Student at Cornell University, 1892; Assistant in Horticulture, Missouri Botanical Garden, 1893-4; Professor of Horticulture and Horticulturist to the Experiment Station, University of Missouri, 1894—.

SIDNEY CALVERT, B. Sc., A. M.,

Assistant Professor of Chemistry.

B. Sc., McGill University, 1890; Graduate Student, Harvard University, 1890-4, A. M., 1892; Assistant in Chemistry, Harvard University, 1892-4; Private Research Assistant, 1892-4; Assistant Professor of Chemistry, University of Missouri, 1894—.

HENRY JACKSON WATERS, B. S. A.,

Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station.

B. S. A., University of Missouri, 1886; Assistant Secretary, Missouri State Board of Agriculture, 1886-8; Assistant in Agriculture to the Missouri Experiment Station, 1888-91; Professor of Agriculture in the Pennsylvania State College and Agriculturist to the Experiment Station, 1892-5; Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station, University of Missouri, 1895—.

ISIDOR LOEB, LL. B., M. S., Ph. D.,

Professor of History and Administration.

B. S., University of Missouri, 1887, M. S., LL. B., 1893; Tutor in History, 1892-4; University Fellow in Jurisprudence in Columbia University, 1894-5; Assistant Professor of History, University of Missouri, 1895-9; Student at the University of Berlin, 1899-1900; Professor of History, University of Missouri, 1899-1901; Ph. D., Columbia University, 1901; Professor of History and Administration, University of Missouri, 1901—.

*BENJAMIN FRANKLIN HOFFMAN, B. L., M. L.,

Professor of Germanic Languages.

B. L., University of Missouri, 1884, M. L., 1888, Assistant Professor of Modern Languages, 1887-92; Student in Paris and Munich, 1892-3; Professor of Modern Languages, University of Louisiana, 1893-5; Student at the University of Chicago, Summer Session, 1895, 1896; Professor of Germanic Languages, University of Missouri, 1895—.

FREDERICK BLACKMAR MUMFORD, M. S.,

Professor of Agriculture.

B. S., Michigan Agricultural College, 1891, M. S., 1893; Assistant in Michigan Agricultural Experiment Station, 1891-5; Assistant Professor of Agriculture, Michigan Agricultural College, 1893-5; Student at the University of Leipzig, 1900, Zurich, 1901; Professor of Agriculture, University of Missouri, 1895—.

*Absent during session of 1902-3.

HENRY MARVIN BELDEN, A. B., Ph. D.,

Assistant Professor of English.

A. B., Trinity College, 1888; Ph. D., Johns Hopkins University, 1895; Instructor in English, Lehigh University, 1890-1, University of Nebraska, 1893-4; Student at the University of Strassburg, 1894-5; Assistant Professor of English, University of Missouri, 1895—.

JOHN MOORE STEDMAN, B. Sc.,

Professor of Entomology and Entomologist to the Experiment Station.

B. Sc., Cornell University, 1888; Instructor in Invertebrate Zoology and Entomology, Cornell University, and Entomologist to the Experiment Station, 1888-90; Biologist to the United States Department of Agriculture, 1890-1; Professor of Biology, Trinity College, 1891-3; Professor of Biology, Alabama Polytechnic Institute, Agricultural and Mechanical College, and Biologist to the Experiment Station, 1893-5; Professor of Entomology, University of Missouri, and Entomologist to the Experiment Station, 1895—.

RAYMOND WEEKS, A. B., Ph. D.,

Professor of Romance Languages.

A. B., Harvard University, 1890, A. M., 1891; Instructor in French, University of Michigan, 1891-3; Traveling Fellow to Harvard University (Paris and Berlin), 1893-5; Ph. D., Harvard, 1897; Professor of Romance Languages, University of Missouri, 1895—.

WILLIAM GEORGE BROWN, B. S., Ph. D.,

Professor of Chemistry.

B. S., University of Virginia, 1877; Professor of Chemistry, University of Tennessee, 1877-83; Student in Heidelberg, 1880-1; Instructor in Chemistry, University of Virginia, 1883-5; Morgan Fellow, Harvard University, 1884; Professor of Chemistry and Physics, South Carolina Military Academy, 1885-6; Professor of Chemistry, Washington and Lee University, 1886-94; Ph. D. (Hon.), University of North Carolina, 1889; Assistant Chemist, U. S. Department of Agriculture, 1894-6; Professor of Chemistry, University of Missouri, 1896—.

JOHN RUTLEDGE SCOTT, A. B., A. M.,

Professor of Elocution.

A. B., Ohio University, 1864, A. M., 1867; studied with James E. Murdoch, 1871; Instructor in Elocution, Washington University, 1877-88; Instructor in Vocal Culture, Johns Hopkins University, 1893-7; Professor of Elocution, University of Missouri, 1897—.

HOWARD BURTON SHAW, B. C. E., A. M.,

Professor of Electrical Engineering.

A. B., University of North Carolina, 1890, B. C. E., 1891; Instructor in Mathematics, University of North Carolina, 1889-90, and Instructor in Mathematics, Surveying and Drawing, 1891-3; in engineering work with Phoenix Iron Company, 1892; A. M., Harvard University, 1894; Assistant

in Electrical Engineering Laboratory, Lawrence Scientific School, Harvard University, 1894-6; in engineering work with Consolidated Traction Company, 1896; Assistant Professor of Electrical Engineering, University of Missouri, 1896-9; Professor of Electrical Engineering, 1899—.

CURTIS FLETCHER MARBUT, B. S., A. M.,

Professor of Geology and Mineralogy.

B. S., University of Missouri, 1889; Student at Harvard University, 1893-5; A. M., Harvard University, 1894; Instructor in Geology and Mineralogy, University of Missouri, 1895-7; Assistant Professor of Geology and Mineralogy, 1897-99; studied in Europe, 1899-1900; Professor of Geology and Mineralogy, University of Missouri, 1899—.

JOHN NELSON FELLOWS, A. M.,

Professor of Mathematics.

B. S., University of Missouri, 1892, M. S., 1893; Student in Harvard University, 1893-5; A. M., Harvard University, 1894; Student in University of Goettingen, 1895-6; Professor of Mathematics and Physics, Peekskill Military College, 1896-8; Professor of Mathematics, University of Missouri, 1898—.

JOSEPH MARTIN WHITE, A. B., A. M.,

Professor of Pedagogy.

Graduate of Kirksville Normal School, 1874; Superintendent of the Louisiana (Mo.) Schools, 1875-7, of the Carrollton Schools, 1878; A. B., University of Michigan, 1881, A. M. (Hon.), 1901; Superintendent of the Carthage Schools, 1885-95; School Examiner for the University of Missouri, 1897-9; Professor of Pedagogy, University of Missouri, 1899—.

GEORGE LEFEVRE, A. B., Ph. D.,

Professor of Zoology.

A. B., Johns Hopkins University, 1891, Fellow, 1894-5, Bruce Fellow 1895-7, Ph. D., 1896; Assistant in Zoology and Embryology, Johns Hopkins University, 1897-8; Instructor in Zoology, Marine Biological Laboratory, Woods Hole, Mass., 1898-1900; Professor of Zoology, University of Missouri, 1899—.

CLARENCE MARTIN JACKSON, B. S., M. S., M. D.,

Assistant Professor (in charge) of Anatomy and Histology.

B. S., University of Missouri, 1898, M. S., 1899, M. D., 1900; Fellow in Biology, 1897-9; Assistant in Anatomy, 1899-1900; Assistant Professor of Anatomy and Histology, 1900—.

EVA JOHNSTON, A. M.,

Assistant Professor of Latin.

Fellow in Latin, University of Missouri, 1894-6, A. M., 1895; Instructor in Latin and Greek, Columbia (Mo.) High School, 1896-9; Student in the Universities of Berlin and Heidelberg, 1899-1901; Assistant Professor of Latin, University of Missouri, 1899—.

CHARLES A. ELLWOOD, Ph. B., Ph. D.,

Professor of Sociology.

Ph. B., Cornell University, 1896; Graduate Student, University of Chicago, 1896-7, 1898-9; Student in University of Berlin, 1897-8; Fellow in Sociology, University of Chicago, 1898-9, Ph. D., 1899; General Secretary of the Charity Organization Society of Lincoln, Nebraska, 1899-1900; Instructor in Sociology, University of Nebraska, 1899-1900; Professor of Sociology, University of Missouri, 1900—.

CHARLES WILSON GREENE, A. B., Ph. D.,

Professor of Physiology and Pharmacology.

A. B., Leland Stanford Jr. University, 1892, A. M., 1893; Ph. D., Johns Hopkins University, 1898; Instructor in Zoology, Marine Biological Laboratory, Woods Hole, Mass., 1896, 1897; Fellow in Physiology, Johns Hopkins University, 1897-8; Assistant Professor of Physiology, Leland Stanford Jr. University, 1898-1900; Professor of Physiology and Pharmacology, University of Missouri, 1900—.

RALPH EMERSON BASSETT, A. B., A. M.,

Assistant Professor of Romance Languages.

A. B., Harvard University, 1889, A. M., 1890; Master in Modern Languages, Belmont School, Mass., 1890-2; Instructor in French and German, De Pauw University, 1892-3; Student of Romance Languages and Philology, Paris, 1893-4; Acting Professor of Modern Languages, College of Charleston, (S. C.), 1895-7; Instructor in Romance Languages, Syracuse University, (N. Y.), 1897-9; Instructor in Romance Languages, College for Women of Western Reserve University, 1899-1900; Assistant Professor of Romance Languages, University of Missouri, 1900—.

MAX MEYER, Ph. D.,

Professor of Experimental Psychology.

Ph. D., University of Berlin, 1896; Research Work, Psychological Laboratory, University of Berlin, 1896-8; Research Work, Clark University, 1899-1900; Professor of Experimental Psychology, University of Missouri, 1900—.

CLARK WILSON HETHERINGTON, A. B.,

Professor of Physical Training and Director of Gymnasiums and Athletics.

A. B., Leland Stanford Jr. University, 1895; Instructor, Encina Gymnasium, Stanford University, 1893-6; Anthropologist and Director of Physical Training, Whittier State School, 1896-8; Fellow in Physiology, Clark University, 1898-9, Fellow and Assistant in Physiology, 1899-1900; Professor of Physical Training and Director of Gymnasiums and Athletics, University of Missouri, 1900—.

FREDERICK PUTNAM SPALDING, C. E.,

Professor of Civil Engineering.

C. E., Lehigh University, 1880; Member of Engineer Corps of the Southern Pacific Railway, 1880-82; Assistant Engineer, Mississippi River

Improvements, 1882-6, and 1888-90; Instructor in Civil Engineering, Lehigh University, 1886-8; Engineer in Charge of Street Extensions, Washington, D. C., 1890-1; Assistant Professor of Civil Engineering, Cornell University, 1891-8; Contracting Engineer, Bethlehem, Pa., 1898-1900; Professor of Civil Engineering, University of Missouri, 1900—.

HERMANN BENJAMIN ALMSTEDT, B. L., Ph. D.,

Assistant Professor of Germanic Languages.

B. L., B. P., University of Missouri, 1895, Ph. D., University of Chicago, 1900; Reader in German, University of Chicago, 1895-8, Assistant, 1898-1900, Associate, 1900-1, Dean in University College (College for Teachers), 1900-1; studied in Germany, 1897; Assistant Professor of Germanic Languages, University of Missouri, 1901—.

JESSE ELIPHALET POPE, M. S.,

Professor of Economics and Finance.

B. S., University of Minnesota, 1895, M. S., 1897; Superintendent of Monticello Schools, 1896-7; Instructor in History, University of Minnesota, 1897-8; Student at Columbia University, 1897-1900, Fellow in Economics, 1898-1900, Honorary Fellow, 1900-1; Professor of Economics and Finance, New York University, 1900-1; Professor of Economics and Finance, University of Missouri, 1901—.

OSCAR MILTON STEWART, Ph. B., Ph. D.,

Assistant Professor of Physics.

Ph. B., De Pauw University, 1892, Ph. D., Cornell University, 1897; Professor of Physics and Chemistry, Baker University, 1892-4; Fellow, Cornell University, 1895-6, Assistant in Physics, 1896-8, Instructor in Physics, 1898-1901; Assistant Professor of Physics, University of Missouri, 1901—.

FREDERICK HANLEY SEARES, B. S.,

Professor of Astronomy, and Director of the Laws Observatory.

B. S., University of California, 1895; Fellow in Astronomy, University of California, 1895-6, Instructor in Astronomy, 1896-8, Graduate Student, 1898-9; Student at the University of Berlin, 1899-1900, at the University of Paris, 1900-1; Professor of Astronomy, University of Missouri, 1901—.

CLARENCE HENRY ECKLES, B. Agr., M. Sc.,

Assistant Professor (in charge) of Dairy Husbandry.

B. Agr., Iowa Agricultural College, 1895, M. Sc., 1897; Graduate Student, University of Wisconsin, 1896; Instructor in Dairying, Iowa Agricultural College, 1896-1901, and Dairy Bacteriologist to the Iowa Experiment Station; Instructor in Dairy Husbandry, Massachusetts Agricultural College, Short Course of 1898-9; Assistant Professor of Dairy Husbandry, University of Missouri, 1901—.

LOUIS INGOLD, A. B.,

Acting Assistant Professor of Mathematics.

A. B., University of Missouri, 1901; Teaching Fellow in Mathematics, 1900-2; Acting Assistant Professor of Mathematics, 1902-3.

GLEN LEVIN SWIGGETT, B. A., Ph. D.,

Acting Professor of Germanic Languages.

B. A., University of Indiana, 1888, Ph. D., University of Pennsylvania, 1901; Graduate Student, Johns Hopkins University, 1889-90 and 1892-3; Instructor in French and German, University of Michigan, 1890-2; Professor of German and Spanish, Purdue University, 1895-1900; Acting Professor of Germanic Languages, University of Missouri, 1902-3.

ARTHUR MAURICE GREENE, JR., B. S., M. E.,

Professor of Mechanical Engineering.

B. S., University of Pennsylvania, 1893, M. E., 1894; Instructor in Drawing, Graphics, and Kinematics, Drexel Institute, 1894-5; Instructor in Mechanical Engineering, University of Pennsylvania, 1895-1902; Mechanical Engineer of the National Export Exposition, Philadelphia, 1899; in charge of Apprentices' School, Franklin Sugar Refinery, Philadelphia, 1893-5; in Engineer's office, Union Traction Company, Philadelphia, summers of 1893, 1897, and 1898; Professor of Mechanical Engineering, University of Missouri, 1902—.

WALTER McNAB MILLER, M. D.,

Professor of Bacteriology and Pathology.

GUY L. NOYES, M. D.,

Professor of Eye and Ear Diseases.

B. M. DUGGAR, Ph. D.,

Professor of Botany.

RICHARD B. MOORE, B. S.,

Instructor in Chemistry.

University College, London, England, 1886-90; Instructor in Chemistry, Oswestry High School (England), 1890-1; Instructor in Chemistry, Birkbeck Technical College, London, 1891-3; British Museum, 1893-5; B. S., Chicago University, 1896; Laboratory Demonstrator, Chicago University, 1896; Instructor in Chemistry, University of Missouri, 1897—.

WILLIAM SIDNEY DREWRY, Ph. B., A. M., Ph. D.,

Instructor in History.

A. B., University of Virginia, 1892, Ph. B., A. M., 1893; Professor of History, Fayetteville (N. C.) Military Academy, 1895-7; Ph. D., Johns Hopkins University, 1899; Instructor in History, University of Missouri, 1900—.

WINTERTON CONWAY CURTIS, A. B., A. M., Ph. D.,

Instructor in Zoology.

A. B., Williams College, 1897, A. M., 1898; Ph. D., Johns Hopkins University, 1901; Assistant in Biology, Williams College, 1897-8; Assistant in Biology, Johns Hopkins University, 1899-1900, Fellow, 1900-1; Instructor in Marine Biological Laboratory, Woods Hole, Mass., 1898-1901; Instructor in Zoology, University of Missouri, 1901.

ROLLA ROY RAMSEY, A. B., A. M., Ph. D.,

Instructor in Physics.

A. B., Indiana University, 1895, A. M., 1898; Ph. D., Cornell University, 1901; Laboratory Assistant in Physics, Indiana University, 1896-7; Professor of Physics, Westminster College (Pa.), 1897-8; Scholar, Clark University, 1898-9; Assistant in Physics, Cornell University, 1899; Instructor in Physics, Indiana University, Dec. 1899-1900; Scholar, Cornell University, 1900-1; Instructor in Physics, University of Missouri, 1901—.

GEORGE MASON TUCKER, Ph. D.,

Instructor in Agriculture.

B. S., Rhode Island College of Agriculture and Mechanic Arts, 1894; Assistant Agriculturist, Rhode Island Experiment Station, 1894-7; Ph. D., University of Gottingen, 1899; Manager of coffee and rubber plantations in Southern Mexico, 1900-2; Instructor in Agriculture, University of Missouri, 1902—.

WILLIAM L. WESTERMANN, A. B., A. M.,

Instructor in Greek.

A. B., University of Nebraska, 1894, A. M., 1896; Instructor in Greek and Latin, Decatur (Ill.) High School, 1896-9; Student at the University of Berlin, 1899-1902; traveled in Greece in 1901; Instructor in Greek in the University of Missouri, 1902—.

A. B. COBLE, Ph. D.,

Instructor in Mathematics.

HERMANN SCHLUNDT, Ph. D.,

Instructor in Chemistry.

CAROLINE T. STEWART, Ph. D.,

Instructor in Germanic Languages.

1. ACADEMIC.

Admission:

Graduates of either sex of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities, and (in exceptional cases, by special permission of the Faculty) other persons of liberal education, are admitted to such graduate work as they are prepared for. Admission to the Graduate Department, however, shall not be understood as implying admission to candidacy for advanced degrees. The credentials of candidates for admission to this Department will be passed upon by the Dean.

Fellowships:

Fellowships are annually established where such additional teaching force is required. Holders of these Fellowships are required to teach five or six hours a week, and receive therefor \$200; and they are exempt from the payment of fees and deposits. For further details, see the general Catalogue.

During the session of 1901-2 Fellowships were held in Anatomy, Chemistry, English, Germanic Languages, Greek, History, Latin, Mathematics, Pathology, Physics, Physiology, and Zoology.

Graduate Club:

A club has been organized by the graduate students for the purpose of furthering their social and scholastic interests in the University and of bringing themselves into touch with graduate student life elsewhere. This club has joined the Federation of Graduate Clubs of the leading American universities, and the Courses here offered are announced in the handbook published by the Federation.

Degrees:

1. *The Master's Degree.*—Only such students are admitted to candidacy for the Master's Degree in Arts or Science as hold a Bachelor's Degree from the University of Missouri or from some other institution in which the requirements for the Academic Bachelor's Degree are equivalent to those of this University. Application for the Master's Degree will be considered on the basis of one year's graduate study in the University. Candidates for this degree are required to take at least twelve (12) hours a week throughout the scholastic year, at least six (6) of which must be chosen from the Courses *Primarily for Graduates*, and the remaining hours selected from those *For Graduates and Undergraduates*.

Candidates for the Master's Degree must choose their Courses from one general subject together with such related subjects as may be approved by the Professor in charge of the candidate's main work.

A creditable thesis evincing capacity for original research and power of independent thought, in the line of the student's previous work, shall be submitted on or before May 1 of the given year.

The subject of the thesis and the Courses chosen shall be laid before the Committee on Graduate Degrees on or before December 1 of each year.

At the close of the scholastic year the University Council may, on the report of this Committee, recommend to the Board of Curators for this degree such candidates as have satisfactorily fulfilled the conditions.

2. *The Doctor's Degree.*—The candidate will be expected to spend at least three years, or, if he have a Master's Degree equivalent in value to the Master's Degree of this University, at least two years in graduate study under University direction and in residence; but with the consent of the Faculty, one of these years may in either case be spent at some other institution, subject to the approval of the Committee on Graduate Degrees.

The candidate must have received from some university or college a Bachelor's Degree in Arts, Letters, Science, or Philosophy equivalent to the Bachelor's Degree of the University of Missouri, and must attain in graduate study at this University a high proficiency in one branch of learning, and a respectable proficiency in at least one other. He must submit a dissertation embodying the results of original investigation, and must pass examinations in his major and minor subjects.

Candidates who have satisfactorily met these conditions may be recommended for the Doctor's Degree in the manner prescribed above for candidates for the Master's Degree.

COURSES OF INSTRUCTION.

[Courses designated by a number with the letter a attached, thus: 4a, 6a, are given the first semester only. Those designated by a number with the letter b attached, thus: 4b, 6b, are given the second semester only. Those designated by a simple number are continuous Courses and are given both semesters.]

Anatomy and Histology

Assistant Professor JACKSON.

Primarily for Graduates.

6. Investigation. Problems for original research will be assigned in Anatomy or Histology. Hours to be arranged. Assistant Professor JACKSON.

Astronomy

Professor SEARES.

Primarily for Graduates.

10. Celestial Mechanics.

11. Research.

Courses 10 and 11 form a continuation of Courses 9 and 5 respectively. The subjects considered depend upon the needs of the students who present themselves. Hours and credit to be arranged with the instructor.

For Graduates and Undergraduates.

5. Advanced Spherical and Practical Astronomy. Lectures and recitations, *S.*, at 8:30. Observatory practice, *T. Th.*, 7:00-10:00 *P. M.*

Open to students who have completed Course 4b of the Announcement of the Academic Department. (See General Catalogue).

6a. History of Astronomy. *M. W. F.* at 10:30.

Open to students who have completed Courses 1a and 1b or 2a of the Announcement of the Academic Department. (See General Catalogue).

7b. Method of Least Squares, with applications to the problems of Astronomy and Geodesy. *M. W.* at 10:30.

8b. Interpolation and Mechanical Quadratures. The formulae of interpolation, numerical differentiation and integration are developed and applied to the problems of Astronomy. *M. W.*, at 10:30.

Courses 7b and 8b are given in alternate years. Course 7b will be given in 1902-3. Both courses are open to students who have completed Differential and Integral Calculus.

9. Celestial Mechanics. The course consists of several subdivisions each of which occupies one semester. For 1901-2 the subdivisions were: 1. General Introduction. 2. Theory of Cometary Orbits. *M. W. F.* at 9:30.

Open to students who have completed Analytic Mechanics and Elementary Differential Equations and who have a reading knowledge of French and German.

The Laws Observatory:

The practical work of the Department of Astronomy is carried on with the instruments of the Laws Observatory.

The observatory, a building 84 feet long from east to west, and from 14 to 30 feet wide, stands on an elevated portion of the campus. The equipment consists of a 7 1-2 inch equatorial refracting telescope by Merz and Soehne, of Munich, a 2 1-10 inch transit instrument by Brunner, of Paris, a 2 1-8 inch altitude and azimuth instrument by E.

and G. W. Blunt of New York, sidereal and mean-time clocks, sidereal break-circuit chronometer, chronograph, sextants, micrometer, spectro-scope and outfit of smaller instruments.

Clocks and instruments are mounted on piers of solid masonry, isolated from the floors and walls of the buildings, and are provided with the usual electrical connections. The dome of the telescope is 18 feet in diameter. A cone, 14 feet in diameter, revolving on balls, shelters the altitude and azimuth instrument.

In the year 1880, Dr. S. S. Laws, then President of the University, contributed largely from his private funds toward the improvement of the observatory building and instruments. In recognition of his generosity the board of curators named the observatory in his honor.

Botany

Professor DUGGAR.

[Courses will be announced later.]

Chemistry

Professor BROWN; Assistant Professor CALVERT; Mr. MOORE.

Primarily for Graduates.

14. Research. This will consist principally of original work, and investigations in Inorganic, Organic and Physical Chemistry and will be adapted in some measure to individual cases.

For Graduates and Undergraduates.

4. Organic Chemistry. Lectures, laboratory work, and recitations. *Three times a week.*

8b. Chemical Theory. Lectures and recitations. *Three hours a week.*

9a. History of Chemistry. Lectures and recitations. *Three hours a week.*

10. Physical Chemistry. Lectures, laboratory work, and recitations. *Three times a week.*

Hours of all Courses to be arranged with the instructors.

Classical Achæology and the History of Art

Professor PICKARD.

Primarily for Graduates.

14. Topography and monuments of Athens, based on a careful study of Pausanias. *T. Th., at 8:30.*

15. Archæological Seminary. Interpretation of monuments and discussion of disputed points in the history of art and artists.

For Graduates and Undergraduates.

6. History of Greek Art. An introductory study of Assyrian and of Egyptian Art, followed by a special study of the development of Greek Architecture and Sculpture from the VII Century B. C. to the I Century A. D. *T. Th. S., at 2.*

7a. Mycenæan Art, or Art of Primitive Greece, discussing particularly the discoveries in Troy, Mycenæ, Tiryns, the Argive Heræum, and Crete. *M., at 2.*

8b. Introductory study of Greek Vases and Vase Paintings. Rayet et Collignon's *La Ceramique Grecque* and Pottier's *Catalogue of the Louvre Vase Collections* will be used as reference books. *M., at 2.*

9. Etruscan and Graeco-Roman Art. The study of Etruscan Art is based on Martha, "L'Art Etrusque." The study of Graeco-Roman Art is carried down to Byzantine times. *M. W., at 9:30.*

10. Roman Life. A systematic study of the Topography of Rome and of the extant remains particularly of Rome and Pompeii. *T. Th., at 9:30.*

11. History of Renaissance Painting. *First semester*, Painting of the Netherlands and of Germany; *Second semester*, Italian Painting. *T. Th. S., at 4.*

13. Masterpieces of Architecture, Sculpture, and Painting of Classical, Renaissance, and Modern times. The course will be fully illustrated with the stereopticon. *M., at 4.*

By the purchase, during the past year, of photographs, casts, and lantern slides the means of illustrating the various Courses have been very largely increased. This is specially true of Courses 6, 10, 11, and 13.

Museum of Classical Archaeology:

An excellent beginning has been made in equipping a laboratory for the study of Classical Archæology. For this purpose the third floor of the west wing of Academic Hall is fitted up. It is now supplied with models of temples illustrating the three orders of Greek Architecture and with plaster casts of representative specimens of Greek and Roman sculpture. These are arranged chronologically, and on the walls are hung a large number of framed photographs of other works of classic art. The Museum also possesses about a thousand other photographs, a large and fine collection of lantern slides, and many plans and charts.

Renaissance and Modern Painting:

To illustrate the Courses in Renaissance and Modern Painting a large number of carbon photographs and of photogravures of the masterpieces of Flemish, Dutch, German, Italian, French, English, and American painting have been framed and hung in the picture gallery near the Museum of Classical Archæology. A few of the best reproductions in color of famous paintings are also to be seen here. In addition to many other unframed photographs, the gallery also has an excellent collection of lantern slides, some of which reproduce the colors of the originals.

Economics

Professor POPE.

Primarily for Graduates.

4. Economic Theory. Private readings, essays and lectures. *Three hours a week.* Hours to be arranged.

5. Seminary. Open to graduates and those who, in the opinion of the instructor, are fitted for the work. *Three hours a week.* Hours to be arranged.

For Graduates and Undergraduates.

2. Science of Finance. Selected text-books, essays and lectures. Open to those who have had Course 1. *M. W. F., at 8:30.*

3. Economic Problems. Essays and lectures. As an introduction to this course, there will be a series of lectures on theory and technique of statistics. Open to those who have had Course 1. *M. W. F., at 10:30.*

English

Professor ALLEN; Assistant Professor PENN; Assistant Professor BELDEN.

Primarily for Graduates.

15. Anglo-Saxon (Advanced Course). *First semester*, Beowulf; Anglo-Saxon grammar (phonology), and brief history of the language. *Second semester*, Cynewulf, and selected miscellaneous poems; history of Anglo-Saxon literature. *T. Th. S., at 3.* Assistant Professor PENN.

16. Gothic and Old Saxon. *First semester*, Gothic grammar and readings, with lectures on the phonology and inflection of primitive Germanic. Streitberg's Gotisches Elementarbuch and Urgermanische Grammatik. *Second semester*, Old Saxon. Holthausen's Altsaechsisches Elementarbuch. *M. W. F., at 3.* Assistant Professor BELDEN.

For Graduates and Undergraduates.

5. Eighteenth century literature. *First semester*, Dryden and Pope; *Second semester*, Swift and the novelists. *W. F., at 9:30.* Assistant Professor BELDEN.

6. Seventeenth century literature, exclusive of the drama. In the first semester special attention will be given to the pastoral, from Spenser to Milton; in the second, to the innovations of Donne. *W. F., at 9:30.* Assistant Professor BELDEN.

7. Shakspeare. Eight to ten selected plays: class-room reading and interpretation; detailed study of style. *M. W. F., at 3.* Assistant Professor PENN.

8. The English Drama. *First semester*, Chief Plays of Shakspeare, in approximate chronological order. A study of the development of Shakspeare's art and genius. *Second semester*, the English Drama (exclusive of Shakspeare) from its beginnings to the Restoration (1250-1660). Lectures. Selected plays, and reports; occasional essays. *W. F., at 10:30.* Assistant Professor PENN.

9. Tennyson and Browning. Readings, class-room study and interpretation of texts, and occasional papers by members of the class. *W. F., at 10:30.* Assistant Professor PENN.

12. Anglo-Saxon. Prose and Poetry. *M. W. F., at 11:30.* Professor ALLEN.

13. Middle English. *W. F., at 8:30.* Professor ALLEN.

14a. The French Element in English. *First semester, W. F., at 9:30.* Professor ALLEN.

Knowledge of French and Latin necessary.

14b. Principles of English Etymology. *Second semester, W. F., at 9:30.* Professor ALLEN.

Courses 5 and 6 and Courses 8 and 9 are given only in alternate years. Course 6 will be given in 1902-3.

Geology and Mineralogy

Professor MARBUT.

Graduate work in Geology may be pursued along either the geographical or the purely geological side of the subject and facilities are offered for the pursuit of either side both in the field and in the laboratory.

The following Courses are offered:

Primarily for Graduates.

10. Experimental Geology. Facilities will be offered for making experiments in erosion and in the deformation of rocks.

For Graduates and Undergraduates.

8. Geomorphology. Special field and laboratory study of land form and geographical development. Laboratory work will include the correlation of forms studied in the field with similar forms elsewhere and the production of contour maps and relief models.

9. Field Geology. The detailed study, with the preparation of reports and maps, of geologically important districts. The selection of the area to be studied may be made by the student, with the approval of the Professor, from localities within convenient reach.

Hours of all courses to be arranged with the instructor.

Germanic Languages

*Professor HOFFMAN; Assistant Professor ALMSTEDT (*in charge*); Acting Professor SWIGGETT.

Primarily for Graduates.

9. Pseudo-Classicism in German Literature. This Course is to acquaint the student with the important writings and writers of the pseudo-classic period; to give a clear idea of the character of epochs, and of the development and decline of literary tendencies, forms and ideals; to show the influences of political and religious history on the literature of this time. *T. Th. S.*, at 2. Acting Professor SWIGGETT.

10. Middle High German. This Course will comprise a careful study of Middle High German phonology, inflections and syntax, as contained in Paul's *Mittelhochdeutsche Grammatik*; a study of Hartman von Aue's *Der Arme Heinrich*, and *Gudrun*, noting differences in constructions, phraseology, and meaning of words, as compared with modern German; lectures on the literature of the period. *M. W. F.*, at 11:30. Acting Professor SWIGGETT.

11a. Historical German Grammar (Lectures in German). This Course is especially adapted for those who are fitting themselves to teach German. A knowledge of Gothic, Old High German, and Middle High German, though very desirable, is not required. Text: Otto Beahaghel, *Die deutsche Sprache*. Leipzig-Prag, 1901. *T. Th. S.*, at 11:30. Assistant Professor ALMSTEDT.

12b. Old High German. This Course will be the foundation for future advanced work in Germanic Philology. Knowledge of Gothic is required. Texts: Braune, *Althochdeutsche Grammatik*², Halle, 1891; Braune, *Althochdeutsches Lesebuch*⁴, Halle, 1897. *T. Th. S.*, at 11:30. Assistant Professor ALMSTEDT.

13. Seminar in Old High German.

13. Seminar in Old High German. The exercises will lead the student to an appreciation of critical work, besides giving him a broader acquaintance with the language, literature and culture of the Old High German

*Absent during the session 1902-3.

Period. Texts : Braune, *Ahd. Gram.*², Halle, 1891 ; Braune, *Ahd. Lesebuch*⁴, Halle, 1897 ; MSD.³, Berlin, 1892. *Three hours a week.* Time to be arranged. Assistant Professor ALMSTEDT.

Prerequisite : Course 12b.

For Graduates and Undergraduates.

4. Schiller. This Course will consist in the study of Schiller's *Jungfran von Orleans*, *Braut von Messina*, *Wilhelm Tell*, in the first semester ; *Wallenstein*, in the second semester. Composition and lectures on Schiller's life and works in both semesters. *T. Th. S., at 10:30.* Assistant Professor ALMSTEDT.

5. Goethe. In the first semester, a careful study will be made of *Egmont*, *Iphigenie*, *Tasso* ; the second semester will be given to the study of *Faust*. Essays written in German ; lectures from time to time on other works of Goethe. The Course is conducted wholly in German, and requires, therefore, a knowledge of spoken German. *M. W. F., at 9:30.* Acting Professor SWIGGETT.

6a. Deutsche Aufsaetze und Stiluebungen. A Course intended primarily for teachers of German, or for students who purpose to become teachers. It consists of oral and written criticism of brief themes upon subjects suggested by the instructor. The work will be conducted in German. *T. Th. S., at 9:30.* Acting Professor SWIGGETT.

7. German Lyric Poetry of the Eighteenth and Nineteenth Centuries. An intensive study of representative poems ; discussions, papers and lectures. This Course will be conducted in German, and a knowledge of spoken German is, therefore, a prerequisite. *M. W. F., at 8:30.* Assistant Professor ALMSTEDT.

8a. German Romanticism. The reactionary causes in German life and literature, and foreign influences leading to romanticism, will be studied in lectures, papers and discussions. The tendencies, forms and productions of the movement will be studied in its principal representatives ; special attention being given to the study of the novel. *T. Th. S., at 10:30.* Acting Professor SWIGGETT.

8b. Grillparzer and Kleist. It is the purpose of this Course to study the drama of the early decades of the nineteenth century in its two best representatives. The social and political forces at work in Europe at this time will also receive attention. *T. Th. S., at 10:30.* Acting Professor SWIGGETT.

Greek

Professor MANLY ; Mr. WESTERMANN.

Primarily for Graduates.

16. Historical Greek Grammar. *Two or three hours a week.* Hours to be arranged.

17. Seminary in Greek Tragedy. *Two or three hours a week.* Hours to be arranged.

For Graduates and Undergraduates.

13a. Greek Theater. Development of the Theater, and discussion of disputed points in the structure of the theater and in the presentation of plays. Doerpfeld and Reisch's "Das Griechische Theater." *T., at 11:30.*

14. Greek Life. Manners and Customs of the Ancient Greeks. Assigned readings and reports. Lectures illustrated by maps, charts, photographs, and stereopticon views. *W. F., at 2.*

15. Homer's Iliad and Odyssey with lectures on the manners and customs of the Homeric period. *T. Th., at 3.*

History and Administration

Professor LOEB ; *Assistant Professor ————— ; Dr. DREWRY.

Introductory Courses 1 to 3 in History (see announcement under Academic Department) or their equivalent must have been completed by graduate students in History and Administration.

Primarily for Graduates.

11. Comparative Administrative Law. A study of the nature and functions of the administration and the control exercised over it in the United States, England, France and Germany. Governmental structure will be studied in detail and local government will be considered with reference to recent development. Given in 1902-3 and alternate years thereafter. *T. Th. S., at 11:30.* Professor LOEB.

12a. Colonial Administration. The history and character of the government of colonies. The modern systems of colonial administration will be considered. Given in 1903-4 and alternate years thereafter. *First semester, T. Th. S., at 11:30.* Professor LOEB.

13b. Municipal Government. A sketch of the history of municipalities followed by a study of the organization and functions of cities in Europe and the United States. Given in 1903-4 and alternate years thereafter. *Second semester, T. Th. S., at 11:30.* Professor LOEB.

*To be appointed before the opening of the next session.

14. Seminary in European History. A course of training in historical research. *May be elected for two, three or four hours.* Assistant Professor ———.

15. Seminary in American History. An investigators' course. In 1902-03 special topics in Missouri history will be studied from the sources. *May be elected for two, three or four hours.* Dr. DREWRY.

16. Seminary in Administration. A course for the investigation of administrative organization and functions. In 1902-3 topics in Missouri administration will be studied from the sources. *May be elected for two, three or four hours.* Professor LOEB.

For Graduates and Undergraduates.

4a. The Middle Ages and the Renaissance. A study of the conditions of Europe during the later Middle Ages and the rise and spread of Italian Humanism. *First semester, T. Th. S., at 9:30.* Assistant Professor ———.

5b. The Era of the Protestant Reformation. This course is a continuation of Course 4a. The causes of the religious reformation will be traced with special reference to its influence upon institutions. *Second semester, T. Th. S., at 9:30.* Assistant Professor ———.

6a. The Revolutionary Period, 1789-1815. The beginning of the Revolution in France, its progress and influence. *First semester, M. W. F., at 10:30.* Assistant Professor ———.

7b. European History in the Nineteenth Century. This course is a continuation of Course 6a. It will trace the policies and relations of European states since 1815 with special reference to the existing social and political institutions. *Second semester, M. W. F., at 10:30.* Assistant Professor ———.

8. Constitutional History of England. A detailed study of the development of the political ideas and institutions of the English people. *W. F., at 8:30.* Assistant Professor ———.

9. Theory of Politics and Jurisprudence. *First semester:* Theory of Politics. A critical and historical study of the theories of the nature and origin of the state and an analysis of sovereignty. *Second semester:* Theory of Jurisprudence. An introduction to legal science. The course treats of the nature, sources and classification of law, and includes a general consideration of the general principles of private law. The nature and use of legal authorities will be discussed. *T. Th. S., at 3.* Professor LOEB.

10. Comparative Constitutional Law. A comparative study of the constitutional law of the principal states of Europe and America. Particular attention will be given to the field of individual liberty defined

in the Constitution of the United States, and interpreted in the decisions of the Supreme Court. *M. W. F., at 3.* Professor LOEB.

Latin

Professor JONES; Assistant Professor JOHNSTON.

Primarily for Graduates.

14. History of the Latin Language. This Course embraces an historical study of the sounds, inflections and syntax of Latin. It is taught wholly by lectures, but requires much collateral reading. *M. W. F., at 10:30.* Professor JONES.

15. Seminary. The object of the Seminary is to familiarize its members with the methods of independent investigation. The work for 1902-3 will consist of critical and exegetical study of Lucretius, Book III. *Three hours a week.* Hour to be arranged. Professor JONES.

For Graduates and Undergraduates.

9. Roman Drama (Plautus and Terence). In this Course particular attention will be given to the early forms, construction, and metres. Considerable attention will also be paid to the development of Latin Comedy. *T. Th. S., at 3.* Assistant Professor JOHNSTON.

11. Latin Literature. This Course includes reading of characteristic selections with the view of presenting the historical development of Latin Literature. *T. Th. S., at 11:30.* Professor JONES.

13. Advanced Latin Composition. *T. Th., at 8:30.* Assistant Professor JOHNSTON.

Mathematics

Professor FELLOWS; *Assistant Professor DEFOE; Acting Assistant Professor INGOLD.

Primarily for Graduates.

11. Spherical Harmonics and Potential Function. *M. W. F., at 10:30.* Professor FELLOWS.

12. Theory of Functions (Introductory Course). *T. Th. S., at 4.* Acting Assistant Professor INGOLD.

13. Theory of Functions (Second Course). *M. W. F., at 3.* Professor FELLOWS.

14. Modern Algebra. *T. Th. S., at 11:30.* Professor FELLOWS.

*Absent during the session of 1902-3.

For Graduates and Undergraduates.

5. Differential and Integral Calculus. *T. Th. S., at 9:30.* Professor FELLOWS.

Text: Byerly's Integral Calculus.

6. Theory of Equations and Determinants. Introduction to the Theory of Invariants. *M. W. F., at 9:30.* Professor FELLOWS.

Text: Burnside and Panton's Theory of Equations.

7a. Infinite Series and Products. *M. W. F., at 8:30.* Professor FELLOWS.

7b. Solid Analytic Geometry. *M. W. F., at 8:30.* Professor FELLOWS.

Text: Smith's Solid Geometry.

8. Advanced Analytic Geometry. *M. W. F., at 11:30.* Professor FELLOWS.

Text: Salmon's Conic Sections.

10. Differential Equations. *T. Th. S., at 8:30.* Professor FELLOWS.

Philosophy and Experimental Psychology**PHILOSOPHY.**

Professor THILLY.

Primarily for Graduates.

6. The Philosophy of Arthur Schopenhauer. A careful study will be made of Schopenhauer's system of thought, particularly as presented in the following works: *Ueber die vierfache Wurzel des Satzes vom zureichenden Grunde*; *Die Welt als Wille und Vorstellung*; *Die Freiheit des Willens*; and *Die Grundlage der Moral*. This course is open only to students who have had adequate training in Logic, Psychology, Ethics, and the History of Philosophy, and possess a reading knowledge of German. *Three hours a week.*

For Graduates and Undergraduates.

4. History of the Development of Thought. The development of human thought will be traced from the early Greek times down to the present. Chief stress will be placed on the following movements: Greek and Roman philosophy; the Jewish religion; primitive Christianity; Gnosticism; the Church Fathers; Scholasticism and Mysticism; the Renaissance and Reformation; the Rationalists and Empiricists; the Critical philosophy of Kant; the post-Kantian Idealists; Herbart and Schopenhauer; the Positivists; Evolutionism; Lotze, Fechner, and Hartmann. *T. Th. S., at 10:30.*

5. Advanced Ethics. A critical study of modern ethical theories with a view to reaching an independent philosophy of conduct. Ample opportunity will be afforded in this course for the preparation of reports and theses and for careful discussions of the different topics to be taken up. No students will be admitted to the class who have not had the introductory work in Psychology and Ethics. *T. Th. S., at 11:30.*

EXPERIMENTAL PSYCHOLOGY.

Professor MEYER.

Primarily for Graduates.

7. Psychological Seminary and Advanced Laboratory Work. Critical reading of recent literature. Discussion of special problems and theories. Research work.

For Graduates and Undergraduates.

These courses are open only to students who have had an introductory course in general Psychology.

4a, 4b. Aesthetics (Psychological Theory of Art). *First semester*, Psychological Theory of Music; *Second semester*, General Aesthetics on a Psychological Basis. Either one of these semester courses may be taken alone. *T. Th. S., at 3.*

5a. Advanced Psychology. Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. *M. W. F., at 8:30.*

6b. Mental Development in the Child and the Race. Experimental methods of child study. Dawning intelligence during animal infancy. Experiments upon the mental processes of animals. Instinct and psychical heredity. Theories of mental evolution. *M. W. F., at 3.*

Physics

Professor LIPSCOMB; Assistant Professor STEWART; Dr. RAMSEY.

Primarily for Graduates.

17. Research work. Assistant Professor STEWART. Hours to be arranged.

For Graduates and Undergraduates.

5. Theory of Light. Lectures and recitations. Based on Preston's Theory of Light. Calculus required. *Three hours a week.* Assistant Professor STEWART.

6. Theory of Heat. Lectures and recitations. Calculus required. *Three hours a week.* Dr. RAMSEY.

7. Theory of Electricity and Magnetism. Calculus required, differential equations recommended. *Three hours a week.* Assistant Professor STEWART.

8b. History of Physics. *Two hours a week.* Professor LIPSCOMB.

9. Advanced work in General Physics. This Course, largely laboratory work, will be adapted to meet the needs and attainments of the individual students. The student may be assigned a definite problem, the literature of which must be studied and the experimental work performed with the care of original research. Lectures and laboratory. *Two to six hours a week.* Assistant Professor STEWART, Dr. RAMSEY.

10. Seminary. Critical reading and discussion of current research work in Physics. A colloquium in which all members of the teaching staff of the department and students of sufficient attainments take part. *One hour a week.*

Physiology

Professor GREENE.

Primarily for Graduates.

7. Investigation. Opportunity is here offered for research into questions of current physiological interest. Problems will be assigned according to the individual needs of the student. Hours to be arranged.

8. Physiological Seminary and Journal Club. *T. at 4.*

For Graduates and Undergraduates.

3a. General Physiology. The principles of Physiology illustrated by the simpler forms of life. Lecture, *F., at 8:30*; Laboratory, *F., Section I, 9:30-12:00*; Section II, *1:30-4.*

4b. Pharmacology. This Course presents the physiological action of chemicals. The laboratory experiments are distributed to groups of students and each group is required to demonstrate to other members of the Course. Lecture, *F., at 8:30*; Laboratory, *F., Section I, 9:30-12:00*; Section II, *1:30-4.*

5b. Chemical Physiology. *Three hours a week.* Lecture *S., at 8:30*; Laboratory hours to be arranged.

6. Advanced Physiology. Special Course open to students who have completed 2 and 3a. Throughout the year. Hours to be arranged.

Romance Languages

Professor WEEKS; Assistant Professor BASSETT.

Primarily for Graduates.

11. The Sixteenth Century. Lectures, readings and reports. The Course includes the period between the close of the literature of

the Middle Ages and the first years of the seventeenth century, with especial attention to the intellectual forces set in motion by the Renaissance and Reformation in France. Some knowledge of the political history of the period will be indispensable. The first semester will be given to a general survey of the period in question through a study of extracts from its leading writers. The second semester will deal chiefly with Montaigne. (*Essais*), and Rabelais, (*Gargantua-Pantagruel*), making a careful study of selected portions of their works. The books needed by the student will be, first semester, Darmesteter et Hatzfeld, *Le Seizieme Siecle en France*; second semester, works of Montaigne and Rabelais, Firmin-Didot, Paris, 2 vols. each. *T. Th. S.*, at 2. Assistant Professor BASSETT.

12. Old French. Paris and Langlois' *Chrestomathie*, with lectures. This Course is open to Graduates properly qualified, and to any Senior who has made a specialty of Romance Languages to the extent of having completed with high credit Undergraduate Courses 1, 2, (or 4), 6, and 8. (See Academic Department in the General Catalogue, Romance Languages.) The epic poem, *Aliscans*, will be read, with close attention to the elements that enter into the poem, the object being to present to the student a practical illustration of text criticism. *M. W. F.*, at 10:30. Professor WEEKS.

20a. Phonetics. A general introduction to philology. This Course is one of general interest to students of philology. The work consists of two parts, historical and practical. The practical work includes an effort to get at the production of speech-sounds from the physiological standpoint. Such works as Grandgent's *English and German Sounds* (Ginn & Co.), and Rousselot's *Principes de Phonetique Experimental*, (Paris), H. Welter, 1897-1901, are used. Numerous tracings showing the actions of the organs of speech are discussed. The University has established a Laboratory of Experimental Phonetics for the more accurate study of the living speech. *M. W. F.*, at 2. Professor WEEKS.

21. Seminary. Opportunity will here be given from time to time for advanced work in various subjects which may seem desirable. *Two hours a week*. Professor WEEKS.

For Graduates and Undergraduates.

10. The Seventeenth Century. An attempt is made in this Course to obtain a general view of the Classic Period. Particular attention will of course be paid to the social and political conditions in France in the seventeenth century. Selections from the works of most of the following authors will be read: Regnier, Rotrou, Corneille, Racine, Cyrano de Bergerac, Moliere, Pascal, Bossuet, La Fontaine, La Rochefoucauld, Mme. de Sevigne, La Bruyere. Professor WEEKS.

A collection of critical works is to be found in the French library, such as various volumes of Sainte-Beuve, Lotheissen, *Geschichte der Französischen Litteratur im XVII Jahrhundert*; Petit de Julleville, *Histoire de la Langue et de la Litterature Francaise*, volumes IV and V.

16. Dante and the Sixteenth Century in Italy. Open to Seniors and Graduates who have had at least two years of French, and who possess a fluent reading knowledge of modern Italian. The purpose of the Course is to take as comprehensive a view as is practicable of the classical literature of Italy. The works studied will be mostly verse, but outside prose reading will be expected. During the first semester Machiavelli's *Il Principe*, Tasso's *Gerusalemme Liberata*, and portions of Ariosto's *Orlando Furioso* will be read. The second semester will be devoted mainly to the study of Dante and the *Divina Commedia* (Ed. Scartazzini, 1 vol., Hoepli, Milan). *T. Th. S., at 9:30.* Assistant Professor BASSETT.

Sociology

Professor ELLWOOD.

Primarily for Graduates.

5a. Ethnology. A study of the evolution and relations of the different races of mankind. *M. W. F., at 10:30.*

5b. Race Psychology. A study of the comparative psychology of races as shown in their customs, institutions, and social organization. *M. W. F., at 10:30.*

6a. Psychological Sociology. A study of the writings of Tarde, Le Bon, and Baldwin, with some attempt to make use of psychological principles in the interpretation of social phenomena. *M. W. F., at 2.*

7b. History of Social Philosophy. The development of social thought from Aristotle to the present. *M. W. F., at 2.*

8. Sociology of Religion. A study of religious phenomena from the sociological standpoint. Not given in 1902-3.

9. Seminar. Sociological investigations and research. *Two, three or four hours a week.*

For Graduates and Undergraduates.

3a. Modern Philanthropy. Lectures on the social treatment of the dependent and defective classes, management of state institutions, etc. Special work required of graduate students. *T. Th. S., at 9:30.*

3b. Criminal Sociology. Lectures on criminal anthropology and on the social treatment of criminals. Special work required of graduate students. *T. Th. S., at 9:30.*

4. Advanced Sociology. Text-book: Giddings' Inductive Sociology. Lectures, and special investigations. *T. Th. S., at 11:30.*

Zoology

Professor LEFEVRE; DR. CURTIS.

Primarily for Graduates.

8. Research. Special investigation of unsolved problems of Zoology in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is required. Hours will be arranged in accordance with the requirements of individual students.

9. Seminary. Meetings at which special subjects of zoological investigation are reported and discussed by instructors and students. Each student is required to give at least six lectures during the year, and experience is thus gained in presenting, in the form of lectures, the results of reading and research. A reading knowledge of French and German is required. *Twice a week.* Hours to be arranged.

For Graduates and Undergraduates.

5a. Embryology of Invertebrates. A study of the development of representative forms from the principal phyla of the Invertebrates. Lecture, *M., at 11:30*; Laboratory, *W. F., at 8:30.* DR. CURTIS.

6. Cytology. A study of the cell, with special reference to problems of development and inheritance. Cytological technique. Lecture, *M., at 9:30*; Laboratory, *W. F., at 9:30.* Professor LEFEVRE.

7a. Principles of Zoology. A course of lectures designed to cover the main principles underlying zoological science. Collateral reading in the writings of Darwin, Huxley, Spencer, Romanes, Galton, Weismann, Hertwig, Brooks, and others. *T. Th., at 11:30.* Professor LEFEVRE.

II. COLLEGE OF AGRICULTURE AND MECHANIC ARTS

A. SCHOOL OF AGRICULTURE.

Candidates for the degree of Master of Science in Agriculture are required to do one year's graduate work at the University. This work must consist of at least 10 hours a week throughout the year and the subjects selected must be advanced Courses, and must be approved by the Dean and the Committee on Graduate Degrees.

Agriculture

Professor MUMFORD; Dr. TUCKER.

For Graduates.

1. *Animal Breeding.* Original research in connection with the methods and practices applicable to the improvement of domestic animals. Material for the study of inbreeding, cross breeding, telegony, etc., and the relation of the phenomena to prepotency will be available in the breeding laboratory at the farm. Professor MUMFORD.

2. *Agronomy.* Original investigation of soils and plants, their inter-relations and the influence of these phenomena upon plant production. The special work undertaken will be determined by the preparation and needs of the student. Dr. TUCKER.

Dairying

Assistant Professor ECKLES.

For Graduates.

1. *Dairy Manufactures.* Investigation of unsolved problems in the manufacture of butter and cheese. This will be chiefly laboratory work and will be arranged to suit the needs of individual students.

2. *Dairy Bacteriology.* A study of certain problems in Bacteriology and their relations to Dairying, with a view to acquainting the student with the methods of research in this line.

For Graduates and Undergraduates.

3b. *Dairy Farming.* The selection, breeding and development of a dairy herd; the growing of crops for the dairyman; the use of the silo; a discussion of the problems of feeding for the production of milk; the marketing of dairy products; the utilization of the by-products of the dairy.

4a. *Dairy Bacteriology*. The contamination of milk, normal and abnormal fermentations; the use of pure cultures and starters; the spread of diseases through the use of milk. Lectures and laboratory work three times a week.

Entomology

Professor STEDMAN.

For Graduates.

4. Graduate work in Entomology. Laboratory work. Monographing a group (scientific); monographing a species (scientific and economic). Hours to be arranged. Must be preceded by Course 3.

For Graduates and Undergraduates.

3. Advanced Entomology. Lectures and laboratory work. Internal anatomy, histology, physiology, embryology, breeding, life histories, habits, economy, distribution, dimorphism, mimicry, determination of species, classification. Hours to be arranged.

Veterinary Medicine

Professor CONNAWAY.

For Graduates.

1. Experimental Study of the Contagious and Infectious Diseases of farm animals, such as tuberculosis, glanders, hog cholera, Texas fever, rabies, etc. The student will make inoculations, study and record clinical phenomena, make post mortems, preserve the diseased tissues and study them microscopically. A study of the literature of each disease is also required. Open to graduate veterinarians, who may be interested in inspection and quarantine work; also to Agricultural and Medical students who have completed the required work in Histology, Physiology, Bacteriology and Pathology offered in the Medical Department.

2. Experimental Study of Veterinary Remedies. This course is intended for Veterinary practitioners who desire to make a study of the physiological action of medicines on the various farm animals, as well as a study of therapeutic action.

3. Investigation. Students who have suitable preparation will have an opportunity to assist in the Experiment Station work.

B. SCHOOL OF ENGINEERING.

Graduate work in Civil, Electrical, and Mechanical Engineering is offered at Columbia to those who have finished the Undergraduate Courses

in these subjects respectively with the degree of Bachelor of Science. Students that, entering under these conditions, have completed a year of graduate work, or two years of professional practice and graduate work *in absentia*, and passed satisfactory examinations thereon, and presented a thesis of real merit, will receive, according to the Course in which they have studied, the degree of Civil Engineer (C. E.), Electrical Engineer (E. E.), or Mechanical Engineering (M. E.). Graduate work in Hydraulic Engineering is offered to those who have completed the work in Civil and Mechanical Engineering.

The thesis subject shall be presented to the Committee on Graduate Degrees on or before November 1, and the thesis shall be presented to the same Committee on or before May 1, of the given year.

Those who with professional practice pursue graduate work *in absentia* must be regularly enrolled as graduate students paying the usual fees.

III. LAW

One year of advanced work leading to the degree of LL. M.

The course is open to Graduates of the Law Department and of other law schools who have completed an equivalent course of study.

The object of this course is to provide the practitioner with a more extended knowledge of important subjects embraced in modern law or cognate thereto than the limited time of the Undergraduate Course permits. It is also intended to afford him assistance in prosecuting the study of any particular subject or branch of law which he expects to follow in his future practice.

The course of instruction embraces lectures, recitations and independent investigation on the following subjects:

Constitutional Law, Corporations, Insurance, Trusts, Patents, Copyrights, Law of Homicide, Theory of Jurisprudence, Practice, Parliamentary Law, Advanced work on Contract and Evidence.

The student is allowed to select any special subject in law for extended examination, to be prosecuted concurrently with elected subjects embraced in the Course. His investigations are directed by the Faculty who advise him of the books and cases to consult, and afford him assistance and counsel.

It is believed that many licensed attorneys will find it to their advantage to take as special students such instruction.

The text-books recommended for the Graduate Course are as follows:

Cooley on Constitutional Limitations; Lewin on Trusts; May on Insurance; Walker on Patents; Bishop on Criminal Law; Thompson on Corporations; Holland and Pollock on Theory of Jurisprudence; Pattison's Forms; Cushing's Parliamentary Law.

A thesis subject shall be selected and presented to the Committee on Graduate Degrees on or before November 1. The thesis shall be submitted to the same Committee on or before May 1, of the given year.

Fees and Expenses

The fee is \$5.00 for a session or any part thereof. This applies to all Departments of the University. Students taking laboratory work must make small laboratory deposits. Room rent, table board, fuel and lights cost from \$2.25 to \$4.50 a week. In the Club-houses of the University the cost does not exceed \$2.25 a week.

For further information, address

IRVIN SWITZLER,

Registrar.

Columbia, Mo.

UNIVERSITY OF ILLINOIS

~~THE CHANCELLOR~~

PRESIDENT'S OFFICE

UNIVERSITY OF MISSOURI

ANNOUNCEMENT

OF THE

GRADUATE DEPARTMENT

1906-1907



COLUMBIA, MISSOURI

UNIVERSITY CALENDAR.

| | |
|--|------------------------------------|
| 1906—April 5..... | Quarterly Meeting of the Curators |
| May 28 to June 2 | Final Examinations |
| June 2, Saturday | Stephens Medal Contest |
| June 3, Sunday..... | Baccalaureate Sermon |
| June 4, Monday..... | Class Day |
| June 5, Tuesday..... | Alumni and Phi Beta Kappa Day |
| June 6, Wednesday | Annual Meeting of the Curators |
| June 6, Wednesday..... | Commencement Day |
| June 9, Saturday | Summer Session Begins |
| August 10, Friday | Summer Session Closes |
| September 10-12 | Entrance Examinations |
| September 11, Tuesday | All Departments Open |
| November 28, Wednesday, 4 p. m., to December | |
| 3, Monday, 8 a. m | Thanksgiving Holidays |
| December 11, Tuesday..... | Semiannual Meeting of the Curators |
| December 20, Thursday, at 4 p. m., to | } Christmas Holidays |
| 1907—January 4, Friday, at 8 a. m. | |
| January 9, | Memorial Day |
| January 21-26 | Mid-Year Examinations |
| January 28-30 | Entrance Examinations |
| January 29, Tuesday | Second Semester Begins |
| April 4,..... | Quarterly Meeting of the Curators |
| May 27 to June 1 | Final Examinations |
| June 1, Saturday | Stephens Medal Contest |
| June 2, Sunday | Baccalaureate Sermon |
| June 3, Monday..... | Class Day |
| June 4, Tuesday | Alumni and Phi Beta Kappa Day |
| June 5, Wednesday | Annual Meeting of the Curators |
| June 5, Wednesday | Commencement Day |

THE GRADUATE DEPARTMENT.

OFFICERS OF INSTRUCTION AND ADMINISTRATION.

Names are printed in the several groups in the order of appointment.

PRESIDENT OF THE UNIVERSITY.

†RICHARD HENRY JESSE, LL. D.,

President, and Professor of Ancient and Mediaeval History.

Student, University of Virginia, 1873-5 and part of 1878; Dean of the Academic Department, University of Louisiana, 1878-84; Professor of Latin, Tulane University, 1884-91; studied in Europe part of 1885 and of 1890; LL. D., Tulane University, 1891; Member of Administrative Board, Congress of Arts and Science, World's Fair, St. Louis, 1904; LL. D., University of Wisconsin, 1904; LL. D., South Carolina College, 1905; Studied in University of Munich, Spring and Summer Semester, 1905, and in University of Berlin, Fall and Winter Semester, 1905-6; President of the University of Missouri, 1891—.

ACTING PRESIDENT OF THE UNIVERSITY.

JOHN CARLETON JONES, A. B., Ph. D.,

Professor of Latin Language and Literature, Dean of the Academic Faculty, and Acting President of the University.

A. B., Westminster College, 1879, A. M., 1882, Ph. D. 1891, Professor of Latin, 1880-2; Graduate Student, Johns Hopkins University, 1882-3; Assistant Professor of Latin and Greek, University of Missouri, 1883-7, Associate Professor of Latin, 1887-91; Student, University of Leipzig and at Rome, 1895-6; Student, University of Munich, 1903-4, Professor of Latin, University of Missouri, 1891—; Dean of Academic Faculty, 1900—; Acting President, 1905-6.

PROFESSORS.

PAUL SCHWEITZER, Ph. D., LL. D.,

Professor of Agricultural Chemistry, and Chemist to the Experiment Station.

Student under Schneider, Sonnenschein, and H. Rose, at Berlin, 1858-60; Chemist to the Soda Ash Works, Schoeningen, 1860-2; Chemist to the Chemical Works at Detmold, 1862-3; Assistant Professor of Chemistry, Polytechnic Institute, Philadelphia, 1864-6; Assistant in School of Mines, Columbia College, 1866-72; Ph. D., University of Goettingen, 1869; LL. D., University of Missouri, 1897; Professor in the University of Missouri, 1872—.

†Absent during session of 1905-6.

EDWARD ARCHIBALD ALLEN, Litt. D.,

Professor of English Language and Literature.

Student, Randolph-Macon College, 1861-62; University of Virginia, 1866-68; Professor of Latin and Greek, Farmville College (Va.), 1873-81; Professor of English and Modern Languages, Central College, 1881-5; Litt. D., Washington and Lee University, 1890; Professor of English, University of Missouri, 1885—.

WILLIAM GWATHMEY MANLY, A. M.,

Professor of Greek Language and Literature.

Student, University of Virginia, 1882-4; Assistant Head Master, McCabe's University School, 1884-6; Professor of Greek, Mercer University, 1886-9; A. M., Harvard University, 1890; American School of Classical Studies at Athens, and traveling in Greece, 1900; Student, University of Berlin, 1904; Professor of Greek, University of Missouri, 1890—.

JOHN WALDO CONNAWAY, D. V. S., M. D.,

Professor of Veterinary and Comparative Medicine, and Veterinarian to the Experiment Station.

D. V. S., Chicago Veterinary College, 1889; M. D., University of Missouri, 1891; Student, Johns Hopkins University, 1894-5; Professor of Physiology, University of Missouri, 1891-7; Professor of Physiology and Veterinarian to the Experiment Station, 1897-1900; Student in Germany, 1904-5; Professor of Comparative Medicine and Veterinarian to the Experiment Station, 1900—.

JOHN PICKARD, A. B., A. M., Ph. D.

Professor of Classical Archaeology and History of Art, and Curator of the Museum of Classical Archaeology.

A. B., Dartmouth College, 1883, A. M., 1886; Student, University of Leipzig, 1889, University of Berlin, 1890, 1895, American School of Classical Studies in Athens, 1890-1, University of Munich, 1891-2; Ph. D., University of Munich, 1892; Student, American School of Classical Studies in Rome, 1901-2; Acting Dean of the Academic Faculty, 1904-5; Professor of Classical Archaeology, University of Missouri, 1892—.

JOHN CHARLES WHITTEN, B. S., M. S., Ph. D.,

Professor of Horticulture, and Horticulturist to the Experiment Station.

B. S., South Dakota Agricultural College, 1891, M. S., 1899; Instructor in Horticulture and Horticulturist (in charge) to the Experiment Station, South Dakota Agricultural College, 1892; Student, Cornell University, 1892; Assistant in Horticulture, Missouri Botanical Garden, 1893-4; Ph. D., University of Halle, Wittenberg, 1903; Professor of Horticulture and Horticulturist to the Experiment Station, University of Missouri, 1894—.

HENRY JACKSON WATERS, B. S. A.,

Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station.

B. S. A., University of Missouri, 1886; Assistant Secretary, Missouri State Board of Agriculture, 1886-8; Assistant in Agriculture to the Missouri Experiment Station, 1888-91; Professor of Agriculture, Pennsylvania State College and Agriculturist to the Experiment Station, 1892-5; Director State Agricultural Exhibit, World's Fair, St. Louis, 1903-4; Student at the University of Leipzig, 1904-5; Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station, University of Missouri, 1895—.

BENJAMIN FRANKLIN HOFFMAN, B. L., M. L.,

Professor of Germanic Languages.

B. L., University of Missouri, 1884, M. L., 1888, Assistant Professor of Modern Languages, 1887-92; Student, Paris and Munich, 1892-3; Professor of Modern Languages, University of Louisiana, 1893-5; Student, University of Chicago, Summer Sessions, 1894, '95, '97; University of Leipzig, 1902-3; Professor of Germanic Languages, University of Missouri, 1895—.

FREDERICK BLACKMAR MUMFORD, B. S., M. S.,

Professor of Animal Husbandry.

B. S., Michigan Agricultural College, 1891, M. S., 1893; Assistant in Michigan Agricultural Experiment Station, 1891-5; Assistant Professor of Agriculture, Michigan Agricultural College, 1893-5; Student, University of Leipzig, 1900, Zurich, 1901; Professor of Agriculture, University of Missouri, 1895-1904; Acting Dean of the College of Agriculture and Mechanic Arts, and Acting Director of the Experiment Station, 1903-5; Professor of Animal Husbandry, 1904—.

JOHN MOORE STEDMAN, B. Sc.,

Professor of Entomology, and Entomologist to the Experiment Station.

B. Sc., Cornell University, 1888; Instructor in Invertebrate Zoology, and Entomology, and Assistant Entomologist to the Experiment Station, 1888-90; Biologist to the United States Department of Agriculture, 1890-91; Professor of Biology, Trinity College, 1891-3; Professor of Biology, Alabama Polytechnic Institute, Agricultural and Mechanical College, and Biologist to the Experiment Station, 1893-5; Professor of Entomology, and Entomologist to the Experiment Station, University of Missouri, 1895—.

RAYMOND WEEKS, A. B., A. M., Ph. D.,

Professor of Romance Languages.

A. B., Harvard University, 1890, A. M., 1891; Instructor in French, University of Michigan, 1891-3; Traveling Fellow, Harvard University (Paris and Berlin), 1893-5; Ph. D., Harvard University, 1897; Student at Paris, 1904-5; Professor of Romance Languages, University of Missouri, 1895—.

WILLIAM GEORGE BROWN, B. S., Ph. D.,

Professor of Chemistry, and Director of the Laboratories.

Miller Scholar, University of Virginia, 1875, B. S., 1877; Professor of Chemistry, East Tennessee University, 1877-8; Professor of General and Agricultural Chemistry, University of Tennessee, 1878-80, Professor of Chemistry and Mineralogy, 1880-3; Student, University of Heidelberg, 1880-1; Instructor in Chemistry, University of Virginia, 1883-5; Morgan Fellow, Harvard University, 1884; Professor of Chemistry and Physics, South Carolina Military Academy, 1885-6; Professor of Chemistry, Washington and Lee University, 1886-94; Ph. D. (Hon.), University of North Carolina, 1889; Assistant Chemist, U. S. Department of Agriculture, 1894-6; Editor, University of Missouri Studies, 1904—, Professor of Chemistry, University of Missouri, 1896—1905, Professor of Chemistry and Director of the Laboratories, 1905—.

ISIDOR LOEB, B. S., LL. B., Ph. D.,

Professor of Political Science and Public Law.

B. S., University of Missouri, 1887, M. S., LL. B., 1893, Tutor in History, 1892-4; University Fellow in Jurisprudence, Columbia University, 1894-5; Assistant Professor of History, University of Missouri, 1895-9; Student, University of Berlin, 1899-1900; Professor of History, University of Missouri, 1899-1901; Ph. D., Columbia University, 1901; Professor of History and Administration, University of Missouri, 1901-2, Chairman, Graduate Conference of the Academic Department, 1904—, Professor of Political Science and Public Law, 1902—.

CURTIS FLETCHER MARBUT, B. S., A. M.,

Professor of Geology and Mineralogy, and Curator of the Geological Museum.

B. S., University of Missouri, 1889; A. M., Harvard University, 1894; Instructor in Geology and Mineralogy, University of Missouri, 1895-7; Assistant Professor of Geology and Mineralogy, 1897-9; Studied in Europe, 1899-1900; Professor of Geology and Mineralogy, University of Missouri, 1899—.

HOWARD BURTON SHAW, A. B., B. C. E., A. M.,

Professor of Electrical Engineering.

A. B., University of North Carolina, 1890. B. C. E., 1891. Instructor in Mathematics, Surveying, and Drawing, 1891-3; in Engineering Work with Phoenix Iron Company, 1892; A. M., Harvard University, 1894; Assistant in Electrical Engineering Laboratory, Lawrence Scientific School, Harvard University, 1894-6; in Engineering Work with Consolidated Traction Company, 1896; Assistant Professor of Electrical Engineering, University of Missouri, 1896-9; Junior Dean of the School of Engineering, 1904-5; Professor of Electrical Engineering, 1899—.

GEORGE LEFEVRE, A. B., Ph. D.,

Professor of Zoology, and Curator of the Zoological Museum.

A. B., Johns Hopkins University, 1891, Fellow, 1894-5, Bruce Fellow, 1895-7, Ph. D., 1896. Assistant in Zoology and Embryology, 1897-8; Instructor in Zoology, Marine Biological Laboratory, Woods Hole, Mass., 1898-9; Professor of Zoology, University of Missouri, 1899—.

CHARLES A. ELLWOOD, Ph. B., Ph. D.,

Professor of Sociology.

Ph. B., Cornell University, 1896; Student University of Chicago, 1896-7, University of Berlin, 1897-8; Fellow in Sociology, University of Chicago, 1898-9, Ph. D., 1899; General Secretary, Charity Organization Society, Lincoln, Nebraska, 1899-1900; Instructor in Sociology, University of Nebraska, 1899-1900; Professor of Sociology, University of Missouri, 1900—.

CHARLES WILSON GREENE, A. B., A. M., Ph. D.,

Professor of Physiology and Pharmacology.

A. B., Leland Stanford Jr., University, 1892, A. M., 1893, Instructor in Physiology, 1893-6; Instructor in Zoology, Marine Biological Laboratory, Woods Hole, Mass., 1896, 1897; Fellow in Physiology, Johns Hopkins University, 1897-8, Ph. D., 1898; Assistant Professor of Physiology, Leland Stanford Jr., University, 1898-1900; Professor of Physiology and Pharmacology, University of Missouri, 1900—.

MAX MEYER, Ph. D.,

Professor of Experimental Psychology.

Ph. D., University of Berlin, 1896; Research Work, Psychological Laboratory, University of Berlin, 1896-8; Research Work, Clark University, 1899-1900; Professor of Experimental Psychology, University of Missouri, 1900—.

FREDERICK PUTNAM SPALDING, C. E.,

Professor of Civil Engineering, and Junior Dean of the School of Engineering.

C. E., Lehigh University, 1880; Member of Engineer Corps, Southern Pacific Railway, 1880-2; Assistant Engineer, Mississippi River Improvements, 1882-6 and 1888-90; Instructor in Civil Engineering, Lehigh University, 1886-8; Engineer in Charge of Street Extensions, Washington, D. C., 1890-1; Assistant Professor of Civil Engineering, Cornell University, 1891-8; Contracting Engineer, Bethlehem, Pa., 1898-1900; Professor of Civil Engineering, University of Missouri, 1900—; Junior Dean of the School of Engineering, 1905—.

JESSE ELIPHALET POPE, B. S., M. S., Ph. D.,

Professor of Economics and Finance.

B. S., University of Minnesota, 1895, M. S., 1897; Superintendent, Monticello Schools, 1896-7; Instructor in History, University of Minnesota, 1897-8; Student, Columbia University, 1897-1900, Fellow in Economics, 1898-1900, Honorary Fellow, 1900; Professor of Economics and Finance, New York University, 1900-1; Ph. D., Columbia University, 1905; Professor of Economics and Finance, University of Missouri, 1901—.

FREDERICK HANLEY SEARES, B. S.,

Professor of Astronomy, and Director of the Laws Observatory.

B. S., University of California, 1895, Fellow in Astronomy, 1895-6, Instructor in Astronomy, 1896-8, Graduate Student, 1898-9; Student, University of Berlin, 1899-1900, University of Paris, 1900-1; Professor of Astronomy, University of Missouri, 1901—.

†BENJAMIN MINGE DUGGAR, M. S., A. M., Ph. D.,

Professor of Botany.

B. S. Agricultural and Mechanical College, Mississippi, 1891; M. S., Alabama Polytechnic Institute, 1892; A. B., Harvard University, 1894 (University Scholar), A. M., 1895 (Townsend Scholar); Botanical Assistant, Illinois State Lab. Nat. Hist., 1895-6; Instructor in Botany, Cornell University, 1896-9, Ph. D., 1898; Student, Universities of Leipzig and Halle, 1899-1900; Naples Biological Laboratory, 1900; Assistant Professor of Botany, Cornell University, 1900-1; Physiologist, Bureau Plant Industry, U. S. Department of Agriculture, 1901-2; Student in France, 1905-6; Professor of Botany, University of Missouri, 1902—.

ARTHUR MAURICE GREENE, JR., B. S., M. E.

Professor of Mechanical Engineering.

B. S., University of Pennsylvania, 1893, M. E., 1894; Instructor in Drawing, Graphics, and Kinematics, Drexel Institute, 1894-5; Instructor in Mechanical Engineering, University of Pennsylvania, 1895-1902; Mechanical Engineer, National Export Exposition, Philadelphia, 1899; in charge of Apprentices' School, Franklin Sugar Refinery, Philadelphia, 1893-5; In Engineers' Office, Union Traction Company, Philadelphia, Summers of 1893, 1897 and 1898; Professor of Mechanical Engineering, University of Missouri, 1902—.

LUTHER MARION DEFOE, A. B.

Professor of Mechanics.

Fellow in Mathematics, University of Missouri, 1891-2; A. B., Harvard University, 1893; Acting Professor of Mathematics, University of Missouri, 1893-4, Assistant Professor of Mathematics, 1894-7, Acting Professor of Mathematics, 1897-8, Assistant Professor of Mathematics, 1898-1902; Student, University of Cambridge (Eng.), 1902-3; Tutor to the University, 1904—; Professor of Mechanics, 1902—.

CLARENCE MARTIN JACKSON, B. S., M. S., M. D.

Professor of Anatomy and Histology.

B. S., University of Missouri, 1898, M. S., 1899, M. D., 1900, Fellow in Biology, 1897-9; Graduate student, University of Chicago, 1900, 1901; University of Leipzig, 1903-4; University of Berlin, 1904; Instructor in Anatomy, University of Missouri, 1899-1900, Assistant Professor (in charge) of Anatomy and Histology, 1900-2, Professor of Anatomy and Histology, 1902—.

†Absent during session of 1905-6.

ALBERT ROSS HILL, A. B., Ph. D., LL. D.

Professor of Educational Psychology, and Dean of the Teachers College.

Munro Bursar, Dalhousie College, Halifax, N. S., 1888-1892, A. B., 1892; Scholar in Philosophy, Cornell University, 1892-3; Student in Heidelberg, Berlin, and Strassburg, Universities, one semester, each, 1893-4; Fellow in Philosophy, Cornell University, 1894-5; Ph. D., Cornell University, 1895; LL. D., South Carolina College, 1905; Professor of Psychology and Education, State Normal School, Oshkosh, Wisconsin, 1895-7; Professor of Philosophy, and Director of the Psychological Laboratories, University of Nebraska, 1897-1903; Professor of Educational Psychology, and Dean of the Teachers College, University of Missouri, 1903—.

EARLE RAYMOND HEDRICK, A. B., A. M., Ph. D.,

Professor of Mathematics.

A. B., University of Michigan, 1896; A. M., Harvard University, 1898; Student in Harvard University, 1897-1899 (in residence), and 1899-1901 (in absentia); Student at Goettingen, Germany, 1899-1901; Ph. D., Goettingen, 1901; Student at Ecole Normale Supérieure, Paris, second semester, 1901; Instructor in Mathematics, Sheffield Scientific School, Yale University, 1901-1903; Professor of Mathematics, University of Missouri, 1903—.

MERRITT FINLEY MILLER, B. S., M. S. A.,

Professor of Agronomy, and Curator of Agricultural Museum.

B. S., Ohio State University, 1900; M. S. A., Cornell University, 1901; Assistant in Soil Survey, Bureau of Soils, U. S. Department of Agriculture, 1901-2; Instructor in Agronomy, Ohio State University, 1902-3, Assistant Professor of Agronomy, 1903-4; Professor of Agronomy, and Curator of Agricultural Museum, University of Missouri, 1904—.

FRANK PIERREPONT GRAVES, Ph. D., Litt. D., LL. D.,

Professor of the History and Principles of Education.

A. B., Columbia University, 1890, A. M. 1891, Ph. D., Boston University, 1892; Litt. D., Heidelberg University (Ohio), 1897; LL. D., Hanover College, 1897; Studied at Harvard University, 1894, University of Chicago, summer of 1901, 1902-4, in Europe part of 1904; Instructor in Greek, Drisler School, 1889; Assistant in Greek, Columbia University, 1890-1; Assistant Professor of Greek, Tufts College, 1891-3; Professor of Classical Philology, 1893-6; President of the University of Wyoming, 1896-8; President of the University of Washington, 1898-1903; Professor of History and Principles of Education, University of Missouri, 1904—.

†HERMANN BENJAMIN ALMSTEDT, B. L., Ph. D.,

Professor of Germanic Languages.

B. L., B. P., University of Missouri, 1895; Reader in German, University of Chicago, 1895-8, Assistant, 1898-1900, Ph. D., 1900, Associate, 1900-1, Dean in University College (College for Teachers), 1900-1; Studied in Germany, 1897, 1905-6; Assistant Professor of Germanic Languages, University of Missouri (in charge, 1902-3), 1901-5, Professor of Germanic Languages, 1905—.

OSCAR MILTON STEWART, Ph. B., Ph. D.,

Professor of Physics.

Ph. B., De Pauw University, 1892; Ph. D., Cornell University, 1897; Professor of Physics and Chemistry, Baker University, 1892-4; Fellow, Cornell University 1895-6, Assistant in Physics, 1896-8, Instructor in Physics, 1898-1901; Assistant Professor of Physics, University of Missouri, 1901-5, Professor of Physics, 1905—.

†Absent during session of 1905-6.

NORMAN MACLAREN TRENHOLME, A. B., A. M., Ph. D..

Professor of History.

A. B., McGill University, 1895, Graduate Student, 1895-6; Graduate Scholar in History, Harvard University, 1896-8, A. M., 1897, Assistant in History, 1898-9, Ph. D., 1899, Non-resident Graduate Student and Harris Fellow in History, studying in Europe, 1899-1900; Professor of History and English Literature, Western University (Can.), 1900-1; Instructor in History and Political Science, Pennsylvania State College, 1901-2; Assistant Professor (in charge) of History, University of Missouri, 1902-5, Professor of History, 1905—.

JUNIUS LATHROP MERIAM, A. B., A. M., Ph. D.,

Professor of Theory and Practice of Teaching.

A. B., Oberlin College, 1895; Student New York State Normal College, 1897-8; Austin Scholar, Harvard University, 1901-2, A. M., 1902; Ph. D., Columbia University, 1905; Superintendent of Schools (Wakeman, Ohio), 1895-7; Principal of Elementary Schools (Akron, Ohio), 1898-9, Supervisor of Practice Teaching (New York State Normal College), 1899-1901; Assistant in Philosophy, Harvard University, 1902-3; Assistant in History of Education, Columbia University, 1903-4; Assistant Professor of Theory and Practice of Teaching, University of Missouri, 1904-5, Professor of Theory and Practice of Teaching, 1905—.

ASSISTANT PROFESSORS.

SIDNEY CALVERT, B. Sc., A. M.,

Assistant Professor of Organic Chemistry.

B. Sc., McGill University, 1890; Graduate Student, Harvard University, 1890-4, A. M., 1892, Assistant in Chemistry, 1892-4, Private Research Assistant, 1892-4; Assistant in Chemistry, Harvard Summer School, 1894; Student, University of Freiburg, 1901-2; Assistant Professor of Chemistry, University of Missouri, 1894-1905; Assistant Professor of Organic Chemistry, 1905—.

HENRY MARVIN BELDEN, A. B., Ph. D.,

Assistant Professor of English Language and Literature.

A. B., Trinity College, 1888; Instructor in English, Lehigh University, 1890-1, University of Nebraska, 1893-4; Student, University of Strassburg, 1894-5; Ph. D., Johns Hopkins University, 1895; Assistant Professor of English Language and Literature, University of Missouri, 1895—.

EVA JOHNSTON, A. M. Ph.D.,

Assistant Professor of Latin.

Fellow in Latin, University of Missouri, 1894-6, A. M., 1895; Instructor in Latin and Greek, Columbia, (Mo.) High School, 1896-9; Student, Universities of Berlin and Heidelberg, 1899-1901; Student, University of Koenigsberg, 1904-5, Ph. D., 1905; Assistant Professor of Latin, University of Missouri, 1899—.

CLARENCE HENRY ECKLES, B. Agr., M. Sc.,

Assistant Professor (in charge) of Dairy Husbandry.

B. Agr., Iowa Agricultural College, 1895, M. Sc., 1897; Student, University of Wisconsin, 1896; Instructor in Dairying, Iowa Agricultural College, and Dairy Bacteriologist to the Iowa Experiment Station, 1896-1901; Instructor in Dairy Husbandry, Massachusetts Agricultural College, Short Course of 1898-99; Student at the Universities of Goettingen and Bern, 1904-5; Assistant Professor (in charge) of Dairy Husbandry, University of Missouri, 1901—.

WALTER SCOTT WILLIAMS, C. E.,

Assistant Professor of Topographic Engineering.

C. E., University of Missouri, 1885; Subdivision Engineer on Construction, Missouri Pacific Railway, 1886; Assistant Engineer on Location and Construction, K. C., F. S. & M. R. R., 1887-90; Chief Engineer on Location and Construction, Hearne & Brazos Valley R. R., 1891-2; Assistant Engineer with Mississippi River Commission, 1893-1901; Assistant Engineer in charge of Precise Levels, U. S. Lake Survey, 1901; Instructor in Civil Engineering, University of Missouri, 1901-3; Assistant Professor of Civil Engineering, 1903-4; Assistant Professor of Topographic Engineering, 1904—.

ABRAHAM LINCOLN HYDE, Ph. B.,

Assistant Professor of Bridge Engineering.

Ph. B., Yale University, 1886; Assistant Engineer, Berlin Iron Bridge Company, 1886-1891; Assistant Engineer, The King Bridge Company, 1891-92; Principal Assistant Engineer, The King Bridge Company, 1892-94; Principal Assistant Engineer, Frank C. Osborn, 1894; Junior Partner, The Osborn Company, Civil Engineers, 1894-6; Consulting Engineer, Cleveland, Ohio, 1896-1901; Official Photographer, American Bridge Company, 1901; Instructor in Civil Engineering, Lehigh University, 1902-3; Assistant Professor of Civil Engineering, University of Missouri, 1903-4; Assistant Professor of Bridge Engineering, 1904—.

ERNEST BROWNING FORBES, B. S.,

Assistant Professor of Animal Husbandry.

B. S. (Zoology), University of Illinois, 1897; Zoological Assistant, Illinois Biological Station, 1894-6; Assistant to the State Entomologist of Minnesota, 1897-8; Zoological Assistant, Illinois State Laboratory of Natural History, 1898; Acting State Entomologist of Minnesota, 1901; Assistant in Animal Husbandry, Illinois Experiment Station, 1901-2; B. S. (Agr.), University of Illinois, 1902; Instructor in Animal Husbandry, 1902-3; Assistant Professor of Animal Husbandry, University of Missouri, 1903—.

WALDEMAR KOCH, B. S., Ph. D.,

Assistant Professor of Physiological Chemistry and Pharmacology.

B. S., Lawrence Scientific School, 1898; Ph. D., Harvard University, 1900; Assistant in Physiology, Harvard Medical School, 1900-1; Assistant in Pharmacology, University of Chicago, 1901-3; Assistant Professor of Physiological Chemistry and Pharmacology, University of Missouri, 1903—.

WINTERTON CONWAY CURTIS, A. B., A. M., Ph. D.,

Assistant Professor of Zoology.

A. B., Williams College, 1897; A. M., 1898; Assistant in Biology, 1897-8; Assistant in Biology, Johns Hopkins University, 1899-1900; Fellow, 1900-1; Ph. D., 1901; Instructor in Marine Biological Laboratory, Woods Hole, Mass., 1898-1903; Instructor in Zoology, University of Missouri, 1901-4; Assistant Professor of Zoology, 1904—.

WILLIAM BAIRD ELKIN, A. B., Ph. D.,

Acting Assistant Professor (in charge) of Philosophy.

A. B., Manitoba University, 1889; Fellow in Philosophy, Cornell University, 1890-1; Acting Professor of Philosophy, Indiana University, 1891-2; Student, Cornell University, 1892-4; Ph. D., Cornell University, 1894; Acting Professor of Philosophy, Colgate University, 1894-5; Student, in Europe, 1895-7; Lecturer on Theory and Practice of Teaching, Teachers College, Columbia University, 1897-9; Acting Professor of Psychology, Logic, and Pedagogics, Hamilton College, 1899-1901; Teacher of History and Civics, Kamehameha Schools, Honolulu, 1901-3; Acting Assistant Professor of Theory and Practice of Teaching, University of Missouri, 1903-4; Acting Assistant Professor of Philosophy, 1904-6.

JOHN BLAKESLEE TIFFANY, B. S., D. V. M.,

Assistant Professor of Veterinary Science.

B. S. A., Cornell University, 1901, D. V. M., 1904, Assistant in Veterinary Anatomy, 1902-4; Instructor in Veterinary Science, University of Missouri, 1904, Acting Assistant Professor (in charge) of Veterinary Science, 1904-5, Assistant Professor of Veterinary Science 1905—.

†WALTER LAFAYETTE HOWARD, B. Agr., B. S., M. S.,

Assistant Professor of Horticulture.

B. Agr., B. S., University of Missouri, 1901, M. S., 1903, Assistant in Horticulture and Assistant Horticulturist to the Experiment Station (in charge of Station work, 1901-2), 1901-3, Instructor in Horticulture, 1903-4, Assistant Professor of Horticulture, 1905—.

ROBERT MONTGOMERY BIRD, A. B., B. S., Ph. D.,

Assistant Professor of Agricultural Chemistry.

A. B., B. S., Hampden-Sidney College, 1897; Professor of Mathematics and Natural Science, Frederick College (Md.), 1898-9; Lecture Assistant, Johns Hopkins University, 1900-1, Ph. D., 1901; Acting Professor of Chemistry, Mississippi Agricultural and Mechanical College, 1901-2; Acting Professor of Agricultural Chemistry and Chemist to the Experiment Station, University of Missouri, 1902-3, Instructor in Agricultural Chemistry, 1903-5, Assistant Professor of Agricultural Chemistry, 1905—.

HERMAN SCHLUNDT, B. S., M. S., Ph. D.,

Assistant Professor of Physical Chemistry.

B. S., University of Wisconsin, 1892, Assistant in Chemistry, 1894-6, M. S., 1896; Instructor in Physics and Chemistry, West Division High School, Milwaukee, Wis., 1896-9; Student, University of Leipzig, 1899-1900; Fellow in Chemistry, University of Wisconsin, 1900-1, Ph. D., 1901, Instructor in Chemistry, 1901-2; Instructor in Chemistry, University of Missouri, 1902-5, Assistant Professor of Physical Chemistry, 1905—.

CAROLINE TAYLOR STEWART, A. B., A. M., Ph. D.,

Assistant Professor of Germanic Languages.

A. B., Kansas University; A. M., University of Michigan, 1895; Student, Bryn Mawr College, 1895-6, Fellow in Germanics, 1897; National Association Collegiate Alumnae Fellow, 1898; Woman's Educational Association Fellow, 1899; Ph. D., University of Berlin, 1901; Instructor in Germanic Languages, University of Missouri, 1902-5; Assistant Professor of Germanic Languages, 1905—.

JONAS VILES, A. B., A. M., Ph. D.,

Assistant Professor of History.

A. B., Harvard University, 1896, A. M. 1897; Teacher in Dalzell's School for Boys, Worcester, 1896-8; Ph. D., Harvard University, 1901; Studied in London, 1901-2; Instructor in History, University of Missouri, 1902-5, Assistant Professor of History, 1905—.

WILLIAM LINN WESTERMANN, A. B., A. M., Ph. D.,

Assistant Professor of Greek.

A. B., University of Nebraska, 1894, A. M. 1896, Student Assistant in Latin, 1894-6; Teacher of Latin and Greek, High School, Decatur, Ill., 1896-9; Student, University of Berlin, 1899-1902, Heidelberg, 1902; Ph. D., University of Berlin, 1902; Instructor in Greek, University of Missouri, 1902-5, Assistant Professor of Greek, University of Missouri, 1905—.

†Absent during session of 1905-6.

MILTON D. BAUMGARTNER, A. B., A. M.,

Acting Assistant Professor of Germanic Languages.

A. B., University of Kansas, 1902, A. M., 1903; Graduate Student, University of Chicago, 1903-5, Germanic Scholar, 1905; Acting Professor of German, Butler College, Winter Quarter, 1904-5; Acting Assistant Professor of Germanic Languages, University of Missouri, 1905-6.

JESSE HARLIAMAN COURSAULT, A. B., A. M.,

Assistant Professor of the Philosophy of Education.

A. B., Ohio State University, 1893, A. M., 1898; A. M., Harvard University, 1900 Scholar in Education, Columbia University, 1903-1904, Fellow in Education, 1904-1905; Teacher in Columbus, Ohio, High Schools, 1894-1899, and 1900-3; Assistant Professor of the Philosophy of Education, University of Missouri, 1905-.

OLIVER DIMON KELLOGG, B. A., M. A., Ph. D.,

Assistant Professor of Mathematics.

B. A., Princeton University, 1899, M. A., 1900; Ph. D., Goettingen, 1902; J. S. K. Fellow in Mathematics, Princeton University, 1899-1901; Student, University of Berlin, 1900-1, Goettingen, 1901-2; Instructor in Mathematics, Princeton University, 1903-5; Assistant Professor of Mathematics, University of Missouri, 1905-.

JACOB KINGSLEY SHAW, B. S.

Acting Assistant Professor of Horticulture.

B. S., University of Vermont, 1899; Horticulturist and Instructor in Horticulture and Chemistry, Baron de Hirsch Agricultural School, Woodbine, N. J. 1902-4; Assistant in Botany and Horticulture, New Jersey College Experiment Station, 1904-5; Acting Assistant Professor of Horticulture, University of Missouri, 1905-6.

INSTRUCTORS.

THOMAS JACOB RODHOUSE, B. S., M. C. E.,

Instructor (in charge) of Mechanical Drawing and Descriptive Geometry.

B. S. in Civil Engineering, University of Missouri, 1887; Fellow, Cornell University, 1904-5, M. C. E., 1905; Instructor in Mechanical Drawing and Descriptive Geometry, University of Missouri, 1897-.

† GRACE SARA WILLIAMS, A. B.,

Instructor in Romance Languages.

A. B., Knox College, 1897; Student, Columbia University, 1898-9; Sorbonne College de France, Ecole des Chartes, Ecole Pratique des Hautes Etudes, 1899-1900; Instituti di Studi Superiori, Florence (winter semester), 1900-1; Rome, Madrid, 1901; Holder of the European Fellowship of the Women's Educational Association of Boston, 1900-1; Eleve Titulaire de l'Ecole Pratique des Hautes Etudes (Section des Sciences Historiques et Philologiques), Paris, 1901; Instructor in Romance Languages, University of Missouri, 1902-.

HOWARD SPAGUE REED, A. B.,

Instructor in Botany.

A. B., University of Michigan, 1903, Assistant in Botany, 1899-1903; Assistant in Marine Biological Laboratory, Woods Hole, Massachusetts, 1902; Instructor in Botany, University of Missouri (in charge, 1905-6), 1903-.

† Absent during session of 1905-6.

† ELEXIOUS THOMPSON BELL, B. S., M. D.,

Instructor in Anatomy.

B. S., University of Missouri, 1901, M. D., 1903, Fellow in Anatomy, 1901-2, Assistant in Anatomy, 1902-3, Instructor in Anatomy (in charge, 1903-4), 1903—.

CHARLES ALBERT PROCTOR, A. B.,

Instructor in Physics.

A. B., Dartmouth College, 1900, Assistant in Physics, 1900-1; Non-resident Fellow of Dartmouth, studying at University of Chicago, 1901-2; Fellow and Assistant in Physics, University of Chicago, 1902-3; Instructor in Physics, University of Missouri, 1903—.

LOUIS DARWIN AMES, A. B., A. M., Ph. D.,

Instructor in Mathematics.

B. L., University of Missouri, 1899; A. B., Harvard University, 1901, A. M., 1902, Ph. D., 1904; Graduate Scholar in Mathematics, Harvard University, 1902-3; Instructor in Mathematics, Chillicothe Normal School, 1890-1900; Instructor in Mathematics, Harvard University, 1901-2; Instructor in Mathematics, University of Missouri, 1903—.

HERBERT MEREDITH REESE, A. B., Ph. D.,

Instructor in Physics.

A. B., Johns Hopkins University, 1897, Fellow in Physics, 1899-1900, Ph. D., 1900; Fellow in Astronomy, Lick Observatory, University of California, 1900-1, Assistant, Lick Observatory, 1901-3; Assistant, Yerkes Observatory, University of Chicago, 1903-4; Instructor in Physics, University of Missouri, 1904—.

JOSEPH DOLIVER ELLIFF, A. B.,

Inspector of Accredited Schools, and Instructor in School Administration.

Graduate, Warrensburg State Normal School, 1893; Principal Central High School, Carthage, Missouri, 1893-4; Principal Joplin (Missouri) High School, 1894-7; Superintendent Joplin Public Schools, 1897-1902; A. B., University of Missouri, 1903; Acting Superintendent of St. Joseph, Missouri, Public Schools, 1903-4; Instructor in School Administration, and Inspector of Accredited Schools, University of Missouri, 1904—.

ALBERT GRANBERRY REED, A. B., A. M.,

Instructor in English.

A. B., Vanderbilt University, 1895; Student, Yale University, 1896-7, A. M., 1897; Scholar in English, Columbia University, 1897-8; Student, Columbia University and University of Chicago, Summers of 1901-4; Fellow in English, University of Chicago, 1904-5; Professor of English and Philosophy, Baker University, 1898-9; Professor of English and History, Austin College, 1899-1900; Professor of English Language and Literature, Hendrix College, 1900-1; Instructor in English, University of Texas, 1901-4; Instructor in English, University of Missouri, 1904—.

ALAN ESTIS FLOWERS, M. E.,

Instructor in Electrical Engineering.

University Scholar, Cornell University, 1898-1900, M. E., 1902; Construction Department, Westinghouse Electric and Manufacturing Company, 1902-3, Engineering Apprentice, 1904, Testing Department, Summer, 1905; Instructor in Electrical Engineering, University of Missouri, 1904—.

† Absent during session of 1905-6.

ARTHUR HENRY RALPH FAIRCHILD, A. B., A. M., Ph. D.,

Instructor in English.

A. B., University of Toronto, 1900; Teaching Fellow, University of Wisconsin, 1900-1; Scholar, Yale University, 1901-3, A. M., 1903, Fellow, 1903-4, Ph. D., 1904; Instructor in English, University of Missouri, 1904—.

CARL CONRAD ECKHARDT, Ph. B., M. A.,

Instructor in History.

Ph. B., Ohio State University, 1902; Assistant in History, University of Michigan, 1902-3, M. A., 1904; Student, Cornell University, Summer, 1905; Assistant in History, University of Missouri, 1903-5, Instructor in History, 1905—.

† LOUIS INGOLD, A. B., A. M.,

Instructor in Mathematics.

Student Assistant in Mathematics, University of Missouri, 1900-1, A. B., 1901, Teaching Fellow in Mathematics, 1901-2, A. M., 1902; Student, University of Chicago, 1902, 1905-6; Acting Assistant Professor of Mathematics, University of Missouri, 1902-3, Assistant in Mathematics, 1903-5, Instructor in Mathematics, 1905—.

ARTHUR ELLIOTT GRANTHAM, A. B., B. S.,

Instructor in Agronomy.

A. B., University of Indiana, 1903; B. S. in Agriculture, University of Missouri, 1905; Assistant Principal, Stockwell (Indiana) High School, 1900-1, 1902-3; Student (College of Agriculture) University of Illinois, 1904; Assistant in Agriculture, Missouri Agricultural Experiment Station, 1904-5; Instructor in Agronomy, University of Missouri, 1905—.

ELIZABETH BEDFORD, A. B., A. M.,

Instructor in Romance Languages.

A. B., University of Missouri, 1901, A. M. 1904, Scholar in Romance Languages, 1903-4, Fellow, 1904-5; Instructor in Romance Languages, University of Missouri, 1905—.

HOWARD VERNON CANTER, A. B., Ph. D.,

Instructor in Latin.

A. B., Washington and Lee University, 1896; Associate Principal and High School Instructor in Latin, French and German, Lexington, Virginia, Public Schools, 1895-98; Fellow, Johns Hopkins University, 1900, Ph. D., 1904, Fellow by Courtesy, 1904; Professor of Latin and Greek, Notre Dame of Maryland, 1901-3; Classical Master, University School, Baltimore, 1903-4; Instructor in Latin, University of Missouri, 1905—.

HOWARD WATERS DOUGHTY, Ph. D.,

Instructor in Chemistry.

Proficient in Electrical Engineering, Johns Hopkins University, 1893, Graduate Student, 1900-4, University Scholar, 1902-3, Fellow, 1903-4, Ph. D., 1904; Research Chemist, General Electric Company, Schenectady, N. Y., Summer of 1903; Fellow by Courtesy, Johns Hopkins University, 1904-5; Carnegie Research Assistant, Bureau of Standards, Washington, D. C., 1904-5; Instructor in Chemistry, University of Missouri, 1905—.

† Absent during sessions of 1905-7.

HELENE M. EVERS, A. B., A. M., Ph. D.,

Acting Instructor in Romance Languages.

A. B., Washington University, 1899; A. M., University of Missouri, 1902; Ph. D., Bryn Mawr College, 1905; Graduate Student, University of Missouri, 1901-3, Fellow in Romance Languages, 1902-3; Fellow in Romance Languages, Bryn Mawr College, 1903-5; Student at Paris, Summer of 1905; Acting Instructor in Romance Languages, University of Missouri, 1905-6.

EDWIN ALLAN FESSENDEN, B. S.,

Instructor in Mechanical Engineering.

American Brake Company (Westinghouse), St. Louis, Summers 1901-2; Assistant Mechanical Engineer, National Candy Company, 1903; Washington University, 1903; B. S. in M. E., University of Missouri, 1904; Chief Draughtsman, Aetna Foundry and Machine Company, Springfield, Illinois, 1904-5; Instructor in Mechanical Engineering, University of Missouri, 1905-.

CAROLINE MCGILL, A. B., A. M.,

Acting Instructor in Anatomy.

A. B., University of Missouri, 1904, A. M., 1905; Student Assistant in Zoology, 1902-4 Fellow in Zoology, 1904-5, Acting Instructor in Anatomy, 1905-6.

TRUMAN MICHELSON, A. B., A. M., Ph. D.,

Instructor in Latin.

A. B., Harvard University, 1902, A. M., 1903, Ph. D., 1904, Non-resident student, studying in Leipzig and Bonn, 1904-5; Instructor in Latin, University of Missouri, 1905-6.

HOMER LEROY SHANTZ, B. Sc., Ph. D.,

Acting Instructor in Botany.

B. Sc., Colorado College, 1901, Instructor in Biology, (in charge, 1902-3), 1901-3; Instructor in Botany, School of Agriculture, University of Nebraska, 1903-5; Fellow in Botany, University of Nebraska, 1903-5, Ph. D., 1905; Acting Instructor in Botany, University of Missouri, 1905-6.

W. D. A. WESTFALL, A. B., Ph. D.,

Instructor in Mathematics.

A. B., Yale University, 1901; Ph. D., Goettingen, 1905; Douglass Fellow, Yale University, 1901-2; Instructor in Mathematics, Yale College, 1902-3; Student at Goettingen, 1903-5; Instructor in Mathematics, University of Missouri, 1905-.

MURRAY SHIPLEY WILDMAN, A. B., Ph. D.,

Instructor in Economics.

A. B., Earlham College, 1893; Teacher of History and Economics, Spiceland Academy and Normal School, 1893-95; Cashier of the Henry County Bank, Spiceland, Indiana, 1895-97, Vice President, 1897-1901; Superintendent of Spiceland Academy and Normal School, 1898-1901; Graduate Student, University of Chicago, 1901-4, Fellow in Political Economy, 1902-4, Ph. D., 1904; Professor of History and Economics, Central College, 1904-5; Instructor in Economics, University of Missouri, 1905-.

GENERAL STATEMENT.

Organization:

Graduate instruction is offered in the Academic Department, Teachers College, School of Agriculture, and School of Engineering. The graduate work of the Academic Department is under the direction and control of the Graduate Conference of that Department. The graduate work of the other departments is under the direction of the respective Faculties.

Admission:

Graduates of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities, and (in exceptional cases by special permission of the faculty) other persons of liberal education, are admitted to such graduate work as they are prepared for. Admission to the Graduate Department, however, shall not be understood, as implying admission to candidacy for advanced degrees, which is subject to the regulations indicated below.

Persons desiring to pursue graduate work in the Academic Department are admitted by the Chairman of the Graduate Conference of that Department. In other departments graduate students are admitted by the respective Deans.

Fees and Expenses:

The fees is \$5.00 for a session or any part thereof. This applies to all departments of the University. Students taking laboratory work must make small laboratory deposits. The estimated cost of room rent and board for students living in Lathrop or Benton Hall, the dormitories for men, varies, according to the room, from \$2.30 to \$2.80 a week. In Read Hall, the dormitory for women, it varies, according to the room, from \$4.50 to \$5.25 a week. The total necessary expenses of a student living in the dormitories for men need not exceed \$150 a year; for girls living in Read Hall, they need not exceed \$225. The necessary expenses for students living in private families vary from \$3 to \$5 a week.

University Fellowships and Scholarships:

The University offers annually a number of University Fellowships yielding stipends of \$250, and University Scholarships with stipends of \$150. University Fellows and Scholars are exempt from payment of tuition and of all fees and deposits in the subject in which they hold fellowships and scholarships. These exemptions increase the value of the fellowships and scholarships by at least \$200 when comparison is made with those in institutions which require the payment of high tuition fees. These fellowships and scholarships will be awarded to the applicants who are best prepared and are of the highest promise in scholarship, irrespective of the lines of work they may desire to pursue. It is expected that fellows and scholars will be prepared for graduate work in the subject which they elect, and that they will devote themselves mainly to the work in this subject. They will do no teaching, but may be called upon to render a limited amount of service to the University in other ways. University fellows and scholars are allowed to engage in outside work only with the consent of the dean of the department and of the professor of the subject which they elect. The Executive Board upon the recommendation of such a dean and professor, may deprive any student of his fellowship or scholarship, whenever it may appear that he is not devoting himself as he should to his work as a fellow or scholar. Applications must be filed not later than April 1, in order to receive consideration in the award for the next Academic year. Applications received after this date and not later than June 1, will be considered in filling any vacancies which may occur in the fellowships or scholarships. Application blanks may be obtained from the Registrar of the University, and, when filled out, should be sent to the President of the University, Columbia, Mo.

Missouri College Union Scholarships:

The University offers annually a number of Academic graduate scholarships to the graduates of the colleges composing the Missouri College Union. The award of these scholarships is subject to the following regulations:

1. A graduate scholarship in the Academic Department is established for each of the colleges composing the Missouri College Union.
2. The faculty of each of said colleges shall be entitled to recommend for such scholarship, on or before March 15th of each year, the student graduating in that year who, in the judgment of the faculty, is best prepared to do graduate work.

3. The University will award a graduate scholarship for one year, with an annual stipend of \$125, to each of the students recommended in the manner indicated above.

4. The holders of these scholarships shall be entitled to all the privileges and exemptions and shall be subject to all of the regulations which are provided for holders of University Scholarships.

Curators' Scholarships:

By order of the Board of Curators, the student who attains the highest grade, or who shall be first in merit, in taking a Bachelor's degree, in the graduating class of any of the colleges or universities composing the Missouri College Union, will be admitted to any department of this University for the first year without the payment of any tuition, library, or incidental fee

Literary and Scientific Societies:

A number of literary and scientific societies are maintained in the University.

The following, conducted by members of the faculties, are open to advanced students: "The Scientific Association," organized with a "General Section" and special Sections of "Biological Science," "Mathematical and Physical Science," and "Social and Political Science," "The Philological Club," "Mathematical Journal Club," and "Zoological Field Club."

The following are conducted by students, in some cases with the participation of members of the faculties: "Graduate Club," "Athenaeum," "Union Literary," "Bliss Lyceum," "Missouri State University Debating Club," "New Era Debating Club," "Medical Society," "Agricultural Society," "Engineering Society," "Der Deutsche Klub," "Sketch Club," "Asterisk Club," "English Club," "History Club," "Students' Meetings of the American Institute of Electrical Engineers."

Publications:

The "University of Missouri Studies," the "Bulletin of the Laws Observatory" and a series of special publications are maintained as a means of publishing the results of original research in the University by instructors and graduate students.

Location:

The University of Missouri is located near the center of the State

in Columbia, a town of about 7,000 inhabitants, situated half way between St. Louis and Kansas City.

It is conveniently reached from the east, north and west by the Wabash Railroad and connecting lines. The Missouri, Kansas and Texas Railroad affords a direct route to Columbia to persons living on that line, and to those living on the Missouri Pacific, St. Louis and San Francisco, and Kansas City, Fort Scott and Memphis Railroads.

The surrounding country is elevated, well drained and diversified. It is a limestone region, remarkable for its healthfulness. The University campus includes 32 acres of undulating ground in the southern part of the town. The Experiment Farm lies one square south of the Campus, and comprises 648 acres. The Horticultural Grounds (a part of the Farm) are one square east of the Campus and include about 30 acres.

Buildings:

* The University has the following buildings:

On the Campus—Academic Hall, separate buildings for Agriculture, Chemistry, Engineering, Geology and Zoology, Law, Mechanic Arts, and Medicine, the Parker Memorial Hospital the Laws Observatory, the power house, the President's house, and Benton Hall and Lathrop Hall—two dormitories for men; on the Farm—the Agricultural Farm buildings and the new Live Stock Judging and Dairy Buildings; on the Horticultural Grounds—the new Horticultural Building, Greenhouses, and Read Hall—the new dormitory for women. A new Gymnasium for men is located on the Rollins Athletic Field. The Gymnasium for women is located in Academic Hall.

Laboratories and Museums:

Laboratories. Facilities for practical instruction in the sciences are provided in the following laboratories: Agronomy, Animal Husbandry, Anatomy, Astronomy, Bacteriology, Botany, Chemistry (including Agricultural Chemistry and Experiment Station work), Dairy Husbandry, Engineering (Civil, Electrical, Sanitary and Mechanical), Entomology, Experimental Psychology, Geology and Mineralogy, Horticulture, Internal Medicine, Mathematics, Pathology, Pharmacology, Phonetics, Physics, Physiology, Physiological Chemistry, Surgery, Veterinary Science and Zoology.

Museums. There are also museums of Agriculture, Classical Archaeology, Ethnology, Geology and Zoology.

University Libraries:

The University libraries comprise the general library and many departmental libraries. They contain about 70,000 volumes. Students have access also to the library of the State Historical Society of some 23,000 volumes.

The University catalogue, which contains further information about the University and its several Departments, may be obtained from the University Publisher, Columbia, Missouri.

I. ACADEMIC DEPARTMENT.

Regulations Governing the Degree of Master of Arts:

The degree of Master of Arts is offered to students who have spent at least one year exclusively devoted to advanced courses of study, and who have submitted an acceptable dissertation and passed all prescribed examinations.

A student wishing to make application for the degree must fill out a blank form, provided for the purpose, and must present it to the Graduate Conference on or before October 1.

In order to be accepted by the Conference as a candidate for the degree, the student must give evidence that he has completed such a liberal undergraduate course of Academic study as is offered by colleges of good standing, and that he has received a baccalaureate degree in Arts or Science equivalent to the baccalaureate degree of the University of Missouri.

In making application the student must indicate the subject of the dissertation and the course of study selected by him on the form referred to above, which must bear the signature of approval of the professor in charge of his major subject, before it is presented to the Graduate Conference for its action. He may, however, defer submitting the subject of the dissertation to the Conference until November 1.

The candidate must choose a major subject, to which he must devote the greater part of his time during the year, and also such other subjects as may be approved. A majority of all work represented in the course of study must be selected from the groups designated as *Primarily for Graduates*.

A dissertation evincing capacity for original research and independent thought in the subject of the major work must be submitted to the Conference for approval on or before May 1. The student should con-

sult the Chairman of the Graduate Conference for information regarding the form in which the dissertation must be presented.

The attention of students is called to the fact that graduate work can not be subjected to rigid regulation, and the Graduate Conference reserves the right to deal with each case on its individual merits.

With the approval of the professors concerned, such candidates as have fulfilled all requirements may, at the close of the year, be recommended by the Graduate Conference to the Board of Curators for the degree of Master of Arts.

Regulations Governing the Degree of Doctor of Philosophy:

1. General Statement.

The degree of Doctor of Philosophy is offered to students who have pursued advanced courses of academic study, without serious interruption, for a period of at least three years, and who have submitted an acceptable dissertation and passed all prescribed examinations.

In order to be accepted by the Graduate Conference as a candidate for the degree of Doctor of Philosophy, the student must give evidence that he has completed a liberal undergraduate course of academic study such as is offered by colleges of good standing, and that he has received a baccalaureate degree in Arts or Science equivalent to the baccalaureate degree of the University of Missouri.

The Conference reserves the right to decide in each case whether the antecedent training has been satisfactory, and, if any of the years of advanced work have been passed away from this University, whether they may be properly regarded as spent in university studies under suitable guidance and favorable conditions. Private study, or study pursued at a distance from libraries and laboratories, will not be considered as equivalent to university work. In any case the student must spend the year immediately preceding his final examinations in residence at the University of Missouri.

It should be emphasized that the requirements for this degree are not computed in terms of time and courses, but that the degree is conferred only upon such students as have reached, after long study, a high attainment in some special branch of learning and have given the clearest evidence of their ability to carry on independent, original research by reason of having made an actual contribution to knowledge of a character approved by competent judges.

2. Acceptance of Candidates:

A student wishing to make application for the degree of Doctor of

Philosophy must fill out a blank form, provided for the purpose, secure thereto the signatures of the instructors with whom he desires to take his major and minor subjects and present it to the Graduate Conference for approval on or before October 1. He must also give satisfactory evidence of ability to translate French and German at sight.

3. *Requirements for the Degree:*

(a) Subjects of Study—Every candidate for the degree must select one principal or major subject, and at least one and not more than two subordinate or minor subjects, the combination to be approved by the Graduate Conference. The instructor with whom the student is taking his major subject acts as his official adviser and has the general direction of his work.

The student's principal work must be in the major subject. Although no regulations are laid down with respect to the time to be devoted to the major and minor subjects, in general it may be stated that the major subject should represent two-thirds of the student's entire time.

(b) Dissertation—The dissertation, embodying the results of original investigation, must be written upon a subject approved by the adviser, and must be submitted to the Conference, legibly written or typewritten, on or before May 1, when it becomes the property of the University. The student should consult the Chairman of the Conference for information regarding the form in which the dissertation must be presented.

Upon receiving the dissertation a committee is appointed whose duty it is to report upon it in writing to the Conference.

The candidate is required to print or publish the dissertation, with such revision as the Conference may allow, and he shall present one hundred and fifty copies of the work to the library of the University. The Conference shall take any necessary action to insure the publication of the dissertation within one year after the conferring of the degree. A brief biographical sketch of the writer must be appended to the dissertation.

(c) Examinations—A committee, consisting of the professor of the candidate's major subject and the professors of his minor subjects, is appointed to take charge of all examinations, and to report upon the same to the Conference in writing.

In addition to final written examinations the candidate may be required to take an oral examination in the presence of the Faculty.

The candidate may, with the approval of the professors in charge,

take the examinations in his minor subjects upon the completion of his work in these subjects, but the final examination in the major subject can not be taken until the dissertation has been approved and accepted.

(d) **Conferring of Degree**—Upon the satisfactory completion of all requirements, the candidate may be recommended by the Graduate Conference to the Board of Curators for the degree of Doctor of philosophy.

COURSES OF INSTRUCTION.

(Courses designated by a number with the letter *a* attached, thus: 4a, 6a, are given the first semester only. Those designated by a number with the letter *b* attached, thus: 4b, 6b, are given the second semester only. Those designated merely by a number are continuous courses and are given both semesters. For causes primarily for undergraduates, see the University Catalogue.)

ANATOMY AND HISTOLOGY.

Professor JACKSON; *DR. BELL; MISS MCGILL.

Primarily for Graduates.

8. **Investigation.** Problems of original research will be assigned in Anatomy or Histology. Hours to be arranged.

For Undergraduates and Graduates.

7. **Advanced Anatomy.** Advanced work in Anatomy or Histology. Hours to be arranged.

ASTRONOMY.

Professor SEARES.

Primarily for Graduates.

11. **Celestial Mechanics.**

12. **Research.**

Courses 11 and 12 form a continuation of courses 10 and 6a, respectively, of the general catalogue. The subjects considered are determined by the needs of the students who present themselves. Hours and credit to be arranged with the instructor.

*Absent during session of 1905-6

For Undergraduates and Graduates.

8b. **Method of Least Squares**, with applications to the problems of Astronomy and Geodesy. M. W., at 10:30.

9b. **Interpolation and Mechanical Quadratures**. The formulae of interpolation, numerical differentiation and integration, developed and applied to the problems of Astronomy. M. W., at 10:30.

Courses 8b and 9b are given in alternate years. Course 8b will be offered in 1906-7. Both courses are open to students who have completed Differential and Integral Calculus.

10. **Celestial Mechanics**. General Introduction and Theory of Cometary Orbits. Open to students who have completed Analytic Mechanics and Elementary Differential Equations and who have a reading knowledge of French and German. Hours to be arranged.

The Laws Observatory:

The practical work of the Department of Astronomy is carried on with the instruments of the Laws Observatory.

The observatory, a building 84 feet long from east to west, and from 14 to 30 feet wide, stands on an elevated portion of the campus. The equipment consists of a 7 1-2 inch equatorial refracting telescope by Merz and Soehne, of Munich, a 2 1-10 inch transit instrument by Brunner, of Paris, a 2 1-8 inch altitude and azimuth instrument by E. & G. W. Blunt of New York, a Pickering stellar photometer and a disc photometer by Brashear, a theodolite, sidereal and mean-time clocks, sidereal break-circuit chronometer, chronograph, sextants, micrometer, spectroscope, and outfit of smaller instruments.

Clocks and instruments are mounted on piers of solid masonry, isolated from the floors and walls of the buildings, and are provided with the usual electrical connections. The dome of the telescope is 18 feet in diameter. A cone 14 feet in diameter, revolving on balls, shelters the altitude and azimuth instrument.

In the year 1880, Dr. S. S. Laws, then President of the University, contributed largely from his private funds toward the improvement of the observatory building and instruments. In recognition of this generosity the Board of Curators named the observatory in his honor.

The Laws Astronomical Medal:

The medal, called the "S. S. Laws Astronomical Medal," is offered annually at Commencement to the student who stands highest in Astronomy, and has at the same time attained a high average of general scholarship. An original thesis, written on some astronomical subject and showing capacity for scientific investigation, is required.

BOTANY.

*Professor DUGGAR; Mr. REED; Dr. SHANTZ.

Primarily for Graduates.

12. **Research.** Problems for investigation may be assigned in any of the general lines of work for which the student may be best prepared. At present the more favorable materials and facilities are at hand along physiological (including ecological) and mycological (including pathological) lines. A knowledge of French (or Latin) and German is essential. *Three or more times a week.* Hours to be arranged. PROF. DUGGAR Mr. REED; Dr. SHANTZ.

13. **Seminary.** The seminary offers to advanced students an opportunity to become familiar with current work in Botany. Reports on appropriate topics will be required, as well as reports on any research work in progress. *Once a week.* Professor DUGGAR; Mr. REED.

For Undergraduates and Graduates.

6. **Mycology.** Studies in the morphology and physiology of representative groups of fungi, including the bacteria. In this course special attention is also given to culture methods, pathological work with fungous diseases, and the collection and preservation of fleshy fungi. Lecture, Th., at 8; Laboratory, W. F., at 1:30-4. Professor DUGGAR; Dr. SHANTZ.

7b. **Comparative Embryology.** A study as comprehensive as the time will permit of the embryology and homologies of representative groups of green plants, also special work in the mitosis of the progametes and micro-technique. (This course will not be offered in 1906-7, but may be expected the following year). Lecture, T., at 8; Laboratory, T. Th., at 1:30-4. Professor DUGGAR, Dr. SHANTZ.

8b. **Histology and Cytology.** Cell structure, mitosis, tissue structure and organography, microtechnique. (This course will be offered in 1906-7, alternating with 7b). Hours to be arranged. Mr. REED.

9b. **Advanced Physiology.** Lectures and experimental work relating to nutrition and growth, the effects of stimuli and toxic agents on cell activities and development, also variation and inheritance. *Three times a week.* Hours to be arranged. Professor DUGGAR, Mr. REED.

10. **Special Problems.** A preliminary to graduate research, and, in exceptional cases, special training in lines not sufficiently emphasized

*Absent during session of 1905-6

by general courses. Laboratory work and a bi-weekly conference for presentation of reports on work assigned. Adequate fundamental work is essential. *Three or more times a week.* Hours to be arranged. Professor DUGGAR, Mr. REED, Dr. SHANTZ.

CHEMISTRY.

Professor BROWN; Assistant Professor CALVERT; Assistant Professor SCHLUNDT; Dr. DOUGHTY; Mr. MORLAN.

Primarily for Graduates.

26. **Radio-activity.** Lectures, experimental work and recitations on the radio-active types of matter and atomic disintegration. (Based on Rutherford's "Radio-activity".) *Three times a week.* Assistant Professor SCHLUNDT.

29b. **Chemical Theory.** Lectures and recitations. *Three times a week.*

30a. **History of Chemistry.** Lectures and recitations. *Three times a week.*

Courses 29b and 30a should be preceded by courses 1 or 2, 11 and 18.

31a and 31b. **Advanced Organic Chemistry.** Selected chapters. Lectures. *Three times a week.* Assistant Professor CALVERT.

35. **Advanced Physical Chemistry.** Lectures on selected topics, supplemented by reading and reports on classical researches. A reading knowledge of French and German is required. Credit and hours to be arranged. Assistant Professor SCHLUNDT.

40. **Mathematical Chemistry.** Lectures on the application of the operations of the higher mathematics to the study of chemical reactions. *Twice a week.* Mr. MORLAN.

50. **Research.** This will consist principally of original work and investigation in (i) Inorganic, (ii) Organic, and (iii) Physical Chemistry, and will be adapted in some measure to individual cases.

A meeting is held weekly, at which reports on current literature, abstracts of special lines of research and the results and progress of investigations are presented for information and discussion. F. at 4.

For Undergraduates and Graduates.

11. **Organic Chemistry.** Lectures and recitations. M. W., at 4; laboratory (one). *Three hours.* Assistant Professor CALVERT.

11A. **Organic Chemistry.** Lectures and recitations (the same as 11. Laboratory (two). *Four hours.* Assistant Professor CALVERT.

12. Preparation of Organic Compounds and Organic Analysis. *Three times a week.* Assistant Professor CALVERT.

13. Industrial Organic Chemistry. Starch, glucose, sugar, fats, oils, soaps, dyes, and other industries. Lectures and recitations. *Three times a week.* Assistant Professor CALVERT.

17. Quantitative Organic Analysis. The determination of the proximate constituents of natural (vegetable and animal) and artificial organic compounds. *Three times a week.* Assistant Professor CALVERT.

18. Physical Chemistry. Lectures, recitations and laboratory. This course should be preceded by courses in general inorganic and organic chemistry or accompanied by course II, or IIA. A knowledge of elementary differential and integral calculus is desirable. Lectures (two) at 8; laboratory (one). *Three hours.* Assistant Professor SCHLUNDT.

18A. Physical Chemistry. Lectures and recitations (the same as course 18). Laboratory (two). *Four hours.* Assistant Professor SCHLUNDT.

19. Physical Chemistry. Laboratory work supplementary to course 18. *Three times a week.* Assistant Professor SCHLUNDT.

20. Advanced Inorganic Chemistry. Lectures and recitations. *Three times a week.*

21a. and 21b. Quantitative Chemical Analysis. Laboratory. *Three times a week.* DR. DOUGHTY.

22. Advanced Quantitative Chemical Analysis. *Six times a week.*

23. Electro-Chemistry. Lectures, recitations and laboratory in electro-chemical measurements. Lectures (two), laboratory (one). *Three hours.* Assistant Professor SCHLUNDT.

24. Electro-Chemistry. Laboratory work supplementary to course 23. *Three times a week.* Assistant Professor SCHLUNDT.

CLASSICAL ARCHAEOLOGY AND THE HISTORY OF ART.

Professor PICKARD.

Primarily for Graduates.

14. Topography and Monuments of Athens. Frazer's Pausanias will be taken as the basis of discussion. A reading knowledge of Greek, French and German required. T. Th., at 8.

15. Archaeological Seminary. Hours and work to be arranged.

For Undergraduates and Graduates.

6. **History of Greek Art.** A preliminary study of Assyrian and Egyptian Art, followed by a study of the development of Greek Architecture and Sculpture. Lectures, collateral readings, essays, with constant use of the lantern, photographic reproductions, and models and casts in the Museum of Classical Archaeology. Greek History (Greek 6a) is recommended to the students of this course. T. Th. S., at 2.

7a. **Mycenaean Art or Art of Primitive Greece.** The earliest discoveries at Mycenae, Tiryns and elsewhere will not be neglected but special attention will be given to the most recent publications on Troy, Crete, and the Argive Heraeum. M., at 8.

8b. **Introductory Study of Greek Vases and Vase Paintings.** Reference book, Pottier's Catalogue of the Louvre Vase Collections. M., at 8.

While a knowledge of the Greek Language is not an absolute prerequisite for 7a and 8b. these courses are intended for advanced students in Greek.

9. **Etruscan and Graeco-Roman Art.** This course should be preceded by course 6. It will deal with the earliest art of the Italian Peninsula, endeavor to show how this art reached its highest development among the Etruscans, how Etruscan influenced early Roman Art, how later Roman Art grew out of early Roman and late Greek Art modified by the circumstances and character of the Romans. Roman History (Latin 12b) is recommended to students in this course. M. W., at 9.

10. **Roman Life.** A systematic study of the topography of Rome and of extant remains particularly of Rome and Pompeii. Lectures and readings. Illustrated by the use of plans, maps, and lantern slides. As supplementary to this course, Roman Public and Private Life (Latin 5) is recommended. T. Th., at 11:30

11. **History of Renaissance Painting.** *First Semester:* Italian Painting. *Second Semester:* Painting of the Netherlands and of Germany. This course should be preceded or accompanied by History 1. With Italian Painting, History 10b is also earnestly recommended. T. Th. S., at 8.

13. **Masterpieces of Architecture, Sculpture, and Painting of Classical, Renaissance and Modern Times.** Lectures fully illustrated with the stereopticon. This course aims to show the historical development of art by the discussion of some of the finest examples in each of the three divisions mentioned. M., at 2.

As supplementary to all courses offered in the history of Painting and of Sculpture the Theory of Representation (Free Hand Drawing) is recommended.

Museum of Classical Archaeology:

The museum occupies the third floor of the west wing of Academic Hall. It is supplied with models of temples representing the three orders of Greek Architecture, and with plaster casts of representative specimens of Greek and Roman sculpture. These are arranged chronologically, and on the walls are hung many framed photographs of other works of classic art. Several original specimens of Egyptian Sculpture have been recently added to the museum. The museum possesses a large number of unframed photographs and an extensive collection of lantern slides.

Renaissance and Modern Painting:

The collections of photographs, lantern slides, and other means of illustrating courses in these subjects have been very largely increased during the past year. For reproducing the color of the originals a *Kromskop* and lantern slides made by the *trichrome* process are used. The picture gallery near the Museum of Classical Archaeology is hung with carbon photographs, photogravures, and other reproductions of masterpieces of painting.

ECONOMICS.

Professor POPE; Dr. WILDMAN.

Primarily for Graduates.

7. **Advanced Economic Theory.** The first semester is occupied with a critical study of the various contributions which prominent writers, from the time of Adam Smith to the present, have made to a theory of Value. A similar study of the theories of Distribution will be carried on through the second semester. *Three times a week.* Hours to be arranged. Dr. WILDMAN.

8. **Seminary, Economic History of Missouri.** Open to graduates and to those who in the opinion of the instructor are fitted for the work. *Two, three or four times a week.* Hours to be arranged. Professor POPE.

For Undergraduates and Graduates.

3a. **Science of Finance.** While this course is chiefly concerned with the principles of taxation, such problems as those of public expenditure, budgetary practice and the proper relation of the State to industry

and trade, are also involved. This course is open to those who have taken course 1 in Economics and should be followed by course 7b in Political Science, also, if possible by course 5b in this department. M. W. F. at 8. Dr. WILDMAN.

4. **Economic Problems.** As an introduction a part of the first semester will be given to the study of the theory and technique of statistics. Some of the problems that will be considered are: hindrances to the movement of capital and labor, trade unions, arbitration, factory legislation, socialism. The work will be largely based on state and national reports. Lectures, essays and private reading. Given in 1905-6 and each alternate year. M. W. F. at 9. Professor POPE.

5a. **Money, Credit and Banking.** This course is concerned with the origin and history of money and the scientific principles involved in monetary theory. The purpose will be to form correct notions regarding the nature and importance of a proper standard of value and system of currency. A study of the principles of credit and banking will be illustrated by a comparison of the banking systems and methods of leading nations. T. Th. S. at 10:30. Dr. WILDMAN.

5b. **Financial History of the United States.** This course presents a study of the financial operations of the Federal Government from the organization of the Treasury Department to the present time. Various phases of our financial practice will be examined and criticized. The course is particularly adapted to the needs of students who have done the work of courses 3a and 5a. T. Th. S. at 10:30. Dr. WILDMAN.

6a. **Industrial History.** It is the purpose in this course to give the student as clear a conception of the conditions of economic life and activity as the time allotted will permit. After a brief review of the Industrial Revolution in England in the 18th century the greater part of the course will be devoted to the industrial development of the United States. Hours to be arranged. Not given in 1905-6.

6b. **Seminary in Railway Economics.** A brief historical survey of American railway development will be followed by a more careful examination of the relations of railways to the state and to their patrons. Hours to be arranged. Dr. WILDMAN.

Eminent lecturers are secured from time to time to address the students on topics of current interest in the field of practical economics.

EDUCATION.

Professor HILL; Professor GRAVES; Assistant Professor COURSAULT.

Advanced courses of study in the History and Principles of Education and Educational Psychology are counted in fulfillment of the requirements for graduate degrees in the Academic Department. For courses of study see statement of Teachers College, p. 53.

ENGLISH.

Professor ALLEN; Assistant Professor BELDEN; Mr. REED;
Dr. FAIRCHILD.

Primarily for Graduates.

20. **Literary Criticism.** Some standard works will first be read, to be followed by more distinctly constructive work in which an attempt will be made to determine the grounds of literary judgment, etc. A training in elementary psychology is desirable. T. Th. S., at 9. Dr. FAIRCHILD.

15. **Anglo-Saxon.** The study of Beowulf will be pursued as an exercise in Old English phonology, in text-criticism, and in the investigation of poetic principles. T. Th. S., at 3. Assistant Professor BELDEN.

For Undergraduates and Graduates.

12. **Anglo-Saxon.** Prose and poetry. M. W. F., at 11:30. Professor ALLEN.

13b. **Middle English.** W. F., at 8. Professor ALLEN.

14a. **The French Element in English.** Knowledge of French and Latin necessary. W. F., at 9. Professor ALLEN.

9. **Poetry of the Victorian Age.** Chief stress is laid on the poetry (narrative, lyric, and dramatic) of Tennyson, Browning, Matthew Arnold; but some attention is given to the other poets of the period. M. W. F., at 10:30. Mr. REED.

7. **Shakespeare.** Eight to ten selected plays; class-room reading and interpretation. A thesis is required. M. W. F., at 3. Dr. FAIRCHILD.

8. **Shakespeare.** The course will be devoted to the critical study of the formal elements of the plays (versification, language, etc.), considered in their organic character, and in their significance for Shakespeare's development. Hour to be arranged. Courses 7 and 8 may be combined to make four hours' credit. Dr. FAIRCHILD.

6. **English Literature of the Seventeenth Century, exclusive of the Drama.** Not given in 1906-7. M. W. F., at 9. Assistant Professor BELDEN.

5. **English Literature of the Eighteenth Century.** First Semester: Dryden and Pope. Second Semester: Swift and the Essayists. M. W. F., at 9. Assistant Professor BELDEN.

GEOLOGY AND MINERALOGY.

Professor MARBUT.

Primarily for Graduates.

Subjects and hours to be arranged.

For Undergraduates and Graduates.

8. **Field Geology.** The detailed study, with the preparation of reports and maps, of geologically important districts. The selection of the area to be studied may be made by the student with the approval of the instructor.

9. **Geomorphology.** Special field and laboratory study of land form.

GERMANIC LANGUAGES.

Professor HOFFMAN; *Professor ALMSTEDT; Assistant Professor STEWART; Acting Assistant Professor BAUMGARTNER.

Primarily for Graduates.

9. **Course in German Literature.** This course is intended to give the student a survey of the field of German literature from its beginning to the present time. Lectures are given in German. Texts: Scherer, etc. T. Th. S., at 10:30. Assistant Professor STEWART.

†10. **History of German Literature.** First Semester; The Reformation and Renaissance (1500-1750). Second Semester: From Klopstock through the period of Romanticism. This course is to give the student an insight into the development and decline of literary tendencies, forms, ideals and the influences that helped to develop them or to accelerate their decline. T. Th. S., at 10:30. Professor HOFFMAN.

†Probably only one of these courses (10, 12b¹, 12b, 14a) can be given in the coming session.

*Absent during the session of 1905-6.

11. Historical German Grammar and Syntax. This course is especially adapted to those who are fitting themselves to teach German. A knowledge of Gothic, Old High German, and Middle High German, though very desirable, is not required. Texts: Otto Behaghel, *Die deutsche Sprache* (Leipzig-Prag, 1902), Streitberg, Kluge, Wunderlich. M. W. F., at 10:30. Assistant Professor STEWART.

†12b¹. **Deutsches Seminar** (neuere Abteilung). Subject to be determined. *Twice a week.* Professor HOFFMAN.

†12b. **History of the Nibelungenlied.** This course is to comprise a study of the various theories as to the origin and authorship of the poem, the controversies in regard to it, and its relation to the Nibelungensaga and other sagas. A reading knowledge of Middle High German is required. M. W. F., at 3. Professor HOFFMAN.

13. Middle High German. Walther von der Vogelweide (first semester); Meier Helmbrecht (second semester). Discipline in phonology, morphology, syntax; comparison of mediaeval with modern idiom; a study in lyric and narrative poetry. M. W. F., at 11:30. Professor ALMSTEDT.

†14a. **Das deutsche Volkslied.** A study of the origin, history and character of German popular song, and its influence on German life, art and literature. *Three times a week.* Professor HOFFMAN.

15b. Old High German. A study of Old High German phonology and forms; critical reading of Old High German texts. A knowledge of Gothic should precede this course. Texts: Braune, *Althochdeutsche Grammatik* (Halle, 1891); Braune, *Althochdeutsches Lesebuch* (Halle, 1897). T. Th. S., at 11:30. Professor ALMSTEDT.

16. Seminary in Old High German. The exercises will lead the student to an appreciation of critical work, besides giving him a broader acquaintance with the language, literature, and culture of the Old High German period. Prerequisite, course 15b. Texts: Same as in 15b, and MSD,³ (Berlin, 1892). *Twice a week.* Professor ALMSTEDT.

17a. Gothic. A consideration of Gothic phonology, morphology, and syntax in connection with reading from Ulfilas. The relationship of Gothic to Indo-European and to later Germanic dialects receives attention in this course. T. Th. S., at 11:30. Professor ALMSTEDT.

†Probably only one of these courses (10, 12b¹, 12b, 14a) can be given in the coming session.

17b. **Old Saxon.** The reading of the Heliand with references to Holthausen, *Altsaechsisches Elementarbuch*. M. W. F., at 10:30. Professor ALMSTEDT.

18. **Old Norse.** A study of the language, literature and mythology. Text-books and time to be determined. Professor ALMSTEDT.

For Undergraduates and Graduates.

4. **Schiller.** This course will consist in the study of Schiller's *Jungfrau von Orleans*, *Maria Stuart*, *Braut von Messina*, *Wilhelm Tell*, *Wallenstein*; essays in German, based on the texts; lectures on Schiller's life and works. Course conducted in German. M. W. F., at 9. Professor HOFFMAN.

5. **Goethe.** In the first semester a careful study will be made of *Egmont*, *Goetz von Berlichingen*, *Hermann und Dorothea*; the second semester will be given to the study of *Iphigenie*, *Tasso*, *Faust*. Essays written in German; lectures on other works of Goethe. The course is conducted in German, and requires, therefore, a knowledge of spoken German. T. Th. S., at 10:30. Professor ALMSTEDT.

*6a¹. **Outline Course in German Literature.** The aim of the course is to acquaint the student with the most important works and movements in the evolution of German literary life. T. Th. S. at 9. Professor HOFFMAN.

*6a. **Modern German Poetry.** This course is to comprise a careful study of representative poems with reference to their kind, merits, the time and circumstances under which they came into being, laying also stress on the study of metrics. Kluge, von Klenze. T. Th. S., at 9. Professor HOFFMAN.

6b. **Deutsche Aufsätze und Stilübungen.** Advanced course in German theme-writing; discussions of grammatical, syntactical, and stylistic points. This course is intended for teachers of German, or for students who propose to become teachers of German; conducted in German. T. Th. S. at 9. Professor HOFFMAN.

*7. **Modern German Drama.** First Semester: Dramas of Kleist, Grillparzer, Hebbel and Ludwig will be studied. Second Semester: Anzengruber, Wildenbruch, Hauptmann, Suderman, Fulda. T. Th. S. at 9. Professor HOFFMAN.

8. **Practical Course in Current German Publications.** *Once a week throughout the year.* Assistant Professor STEWART.

*Probably only one of these courses (6a¹, 6a, 7) can be given in the coming session.

GREEK.

Professor MANLY; Assistant Professor WESTERMANN.

Primarily for Graduates.

15. **Hesiod, Homeric Hymns, and Appollodorus.** This course will deal with the Greek idea of the origin of the world, gods, and men, and the early conception of the universe together with the later developments of the myths. *Three times a week.* Hours to be arranged. Professor MANLY.

16. **Homer.** The whole of the Iliad and Odyssey will be read during the year with especial attention to the antiquities. A special subject will be assigned each student for investigation. Teubner text editions of the poems should be secured in advance. *Two or three times a week.* Hours to be arranged. Professor MANLY.

17. **Herodotus and Thucydides.** (a) First Semester: Herodotus. Rapid reading with a special study of the Persian Wars, and of the status of Herodotus as an historian. (b) Second Semester: Thucydides. A study of the history of the Pentekontaetie (479-431 B. C.), based upon Book I of Thucydides. The other sources upon this period will be read at sight in class, and their historical value and relation to the account of Thucydides will be discussed. *Twice a week.* Hours to be arranged. Assistant Professor WESTERMANN.

18. **Seminary.** This work will be conducted jointly by Professor Manly and Assistant Professor Westermann, and will be adapted to the needs of the graduate students in attendance.

For Undergraduates and Graduates.

12a. **The Greek Theater.** The origin and development of the Greek Theater will be considered, and disputed points in the structure of the theater, and in the presentation of plays will be discussed. The basis of the work will be Doerpfeld and Reisch's *Das Griechische Theater*. T., at 11:30. Professor MANLY.

13b. **Aristophanes.** Selected comedies will be read, and the origin and development of comedy will be considered. Attention will also be given to the life of the people as revealed in the plays. *Twice a week.* Hours to be arranged. Assistant Professor WESTERMANN.

14. **Greek Antiquities.** Investigation of special topics in the public and private life of the Greeks, based upon the Greek authors and the results of recent excavations. *Two or three hours a week.* Hours to be arranged. Professor MANLY.

HISTORY.

Professor TRENHOLME; Assistant Professor VILES; Mr. ECKHARDT;
Mr. VAUGHN.

Primarily for Graduates.

24. **Seminary in Medieval History.** A research course on some special topic in the history of the middle ages to be selected as far as possible with reference to the wishes of the students and the resources of the library. Some little knowledge of Latin will be requisite, and ability to use French and German will be desirable. *May be elected for 2, 3, or 4 hours.* Professor TRENHOLME.

23. **Seminary in English Institutional and Legal History.** This course involves a detailed and careful study of the formation of the English Constitution and of the origin, growth, and development of legal and governmental institutions from the earliest times to the close of the Middle Ages. Special reports based on the sources and secondary authorities will be required from members of the class from time to time. The General Library and the Law Library both contain valuable material for English Institutional History. *May be elected for 2, 3, or 4 hours.* Professor TRENHOLME.

22. **Seminary in American History.** A research course in selected topics in American Colonial History and the political and institutional development of the United States. In the assignment of topics an effort will be made to follow the individual preferences of students. *May be elected for 2, 3, or 4 hours.* Assistant Professor VILES.

21. **Seminary in Missouri History.** A course affording opportunity for investigation in Missouri History. Every student will be expected to investigate from the sources some topic in the narrative or political history of Missouri, to embody the results of his study in written form, and, at the option of the instructor, report to the class. In the assignment of topics preference will be given, as far as possible, to the interests and leanings of the individual student. *May be elected for 2, 3, or 4 hours.* Assistant Professor VILES.

20b. **Advanced United States History.** A study of selected topics in United States History. Lectures, discussion, and reports by the class. *Two or three times a week.* Hours to be arranged. Assistant Professor VILES.

19a. **American Colonial Institutions.** A course on the development of representative institutions, local government, the judiciary, etc., from their origins in English institutions of the sixteenth and seventeenth

centuries to the Revolutionary war. The aim of the course is to trace the growth of the political institutions and ideals underlying the present government of the United States. Reports will be required from every student from time to time. This course should be preceded by the narrative course on the Colonial Period. *Twice a week.* Hours to be arranged. Assistant Professor VILES.

18b. English Constitutional and Legal History Since the Norman Conquest. A continuation of course 18a dealing with later institutions. M. W. F. at 2. Professor TRENHOLME.

18a. English Constitutional and Legal History to the Norman Conquest. A study of early English institutions from the sources and best secondary works. Lectures, reports, and discussion. M. W. F. at 2. Professor TRENHOLME.

16a. Historical Method. A course of training for advanced students of history in the nature of historical research, the methods to be used, auxiliaries to historical study, use of documents, etc. *Once or twice a week.* Professor TRENHOLME.

For Undergraduates and Graduates.

15a. Topics and Studies in Recent European History. A course having for its objects the investigation of special topics of importance in connection with recent European history. Topics will be selected with reference to the resources of the library and the course will be conducted by means of lectures, reports, discussions, and quizzes. Must be preceded by Course 4. M. W. F., at 2. Mr. ECKHARDT.

10a. The Middle Ages. This course will deal with medieval history and institutions from the time of the Roman Empire to the fourteenth century. T. Th. S., at 11:30. Professor TRENHOLME.

11a. History of France to the Sixteenth Century. This course deals with French history from the Treaty of Verdun to the reign of Francis I. The leading events of the period and the chief features of constitutional development will be treated in detail, special emphasis being laid on the life and development of the French Monarchy. Ability to read French will be desirable but not essential. T. Th. S., at 9. Mr. VAUGHN.

11b. History of France to the Sixteenth Century. This course will be a continuation of 11a, and will deal with the political and institutional history of France from about the year 1500. T. Th. S., at 9. Mr. VAUGHN.

14b. **The Era of the Reformation.** A study of the causes, events and consequences of the religious revolutions of the sixteenth century with special attention to the influence of the German Reformation on politics and society. T. Th. S., at 11:30. Professor TRENHOLME.

13b. **The Age of the Renaissance.** A course dealing with the rise of Italian Humanism and the spread of the Renaissance throughout Europe generally. Special attention will be given to the politics, literature, and art of the period. Students who elect this course are advised to take also Course, 11, in the History of Art. Omitted 1906-7. T. Th. S., at 9. Professor TRENHOLME.

Courses 14b and 13b will usually be given in alternate years.

9a. **History of England During the Tudor and Stuart Periods.** A course on the political and constitutional history of England from 1485 to 1688. The English Reformation, the character and the machinery of the Tudor despotism, the Puritan movement, particularly in its social and political aspects, the Restoration, and the revival of parliamentary government in 1688, will be the main topics of study. T. Th. S., at 9. Assistant Professor VILES.

10b. **Modern England.** The political and constitutional history of England since 1688. Especial attention will be given to the rise of parties, to the development of cabinet government, and to Parliamentary Reform in the nineteenth century. No text-book will be used but there will be assigned reading and weekly written tests, as well as oral quizzes and discussions. T. Th. S., at 9. Professor TRENHOLME.

4. **Modern European History.** The political, social, and intellectual history of Continental Europe from 1648 to the present time with special attention to the French Monarchy under Louis XIV, the rise of Prussia and Russia, the struggle for colonial empire, the causes, events, and results of the French Revolution, the Napoleonic era, and the development of nationality and constitutional government in the nineteenth century. T. Th. S., at 9. Mr. ECKHARDT.

7b. **History of Missouri.** After a brief survey of French exploration and colonization in the Mississippi valley, of the Spanish regime, and the early settlements, the Louisiana Purchase and its causes will be taken up in more detail. The primary aim of the course, however, will be to give an account of the development of Missouri since 1803, of the progress of settlement, and of the political and narrative history. Every student will be expected to prepare several reports. This course must be preceded by a course in United States history. T. Th. S., at 9. Assistant Professor VILES.

8b. **History of Modern Colonization.** The purpose of this course will be to trace in outline the extension of the power of the nations of western Europe in other continents. The character and purposes of the colonial policies of these nations, and the narrative history of the more important colonies in America, Asia, and Africa, will be dealt with. Omitted 1906-7. M. W. F., at 2. Mr. ECKHARDT.

6. **History of the United States.** A course in the political and narrative history of the United States since 1763, taking up the development of parties and political ideals, foreign relations, territorial expansion, the slavery question, and the general development of the nation. M. W. F. at 10:30. Assistant Professor VILES.

5a. **American History to 1763.** A course in the political and social development of the American colonies to the expulsion of the French. M. W. F. at 2. Assistant Professor VILES.

LATIN.

Professor JONES; Assistant Professor JOHNSTON; Dr. CANTER;
Dr. MICHELSON.

Primarily for Graduates.

15. **Seminary.** Critical study of a selected author. Hours to be arranged. Professor JONES.

16. **History of the Latin Language.** Sounds, inflections, syntax. M. W. F., at 10:30. Professor JONES.

18. **Sallust.** Sallust's Catiline, Jugurtha, and fragments from the history will be read, and a special subject assigned to each student for investigation. M. W. F., at 10:30. Assistant Professor JOHNSTON.

19. **A Critical Study of Lucretius.** Hours to be arranged. Dr. CANTER.

21. **Comparative Grammar of Sanskrit, Greek, Latin, and Gothic.** Hours to be arranged. This course may be omitted in 1906-7. Dr. MICHELSON.

For Undergraduates and Graduates.

6. **Catullus, the Elegiac Poets and Martial.** Must be preceded by courses 1, 3, and 5. T. Th. S., at 8. Professor JONES.

8a. **General Introduction to the Science of Language.** This course is intended for students of all departments who have linguistic interests. M. W. F., at 10:30. Dr. MICHELSON.

8b. Comparative Grammar of Greek and Latin. This course presupposes an elementary knowledge of Greek and Latin. It is important for those who intend to teach the Classics in high schools. M. W. F., at 10:30. Dr. MICHELSON.

17. Elementary Sanskrit. A limited amount of classical text will be read and the grammar will be carefully examined for the purpose of shedding light on the related languages. An elementary knowledge of Greek and Latin is required. T. Th., at 10:30. Dr. MICHELSON.

9. Roman Drama (Plautus and Terence). Must be preceded by courses 1, 3, and 5. T. Th. S., at 10:30. Assistant Professor JOHNSTON.

10. (a) Tacitus, Annals; (b) Seneca. Must be preceded by courses 1, 3 and 5. W. F., at 10:30. Dr. CANTER.

11. Roman Literature. Characteristic selections. Must be preceded by courses 1, 3 and 5. T. Th. S., at 11:30. Assistant Professor JOHNSTON.

20a. Introduction to Latin Palaeography. Includes the reading of facsimiles. *One hour a week.* Dr. CANTER.

20b. Introduction to Latin Epigraphy. Includes a study of representative inscriptions. *One hour a week.* Dr. CANTER.

23a. Select Latin Inscriptions. Lindsay, Latin Inscriptions. This course may be taken advantageously the same year as 8b. M. W. F., at 8. Dr. MICHELSON.

23b. The Elements of Oscan and Umbrian. M. W. F., at 8. Dr. MICHELSON.

MATHEMATICS.

Professor HEDRICK; Assistant Professor KELLOGG; Dr. AMES; Dr. WESTFALL; *Mr. INGOLD.

(It is especially recommended that students intending to specialize in Mathematics should take courses in French and German in their preliminary work; but an extensive knowledge of the literature of those languages is not necessary.)

The courses past course 5 are open only to those who have secured the permission of the instructor in the course, and of the professor in charge. Courses 19-30 are offered for special work by rather advanced students and are given only when specially announced. Note the changes in numbers of courses.

*Absent during sessions of 1905-7.

Primarily for Graduates.

12a. **Infinite Series and Products.** Introduction to the Theory of Functions of a Real Variable. Lectures. Reference books: Osgood, *Infinite Series*; and *Ency. der Math. Wiss.*, 1A3; besides various general treatises. *Three hours.* Hours to be arranged. Alternate years. Dr. AMES.

12b. **Galois' Theory of Substitutions.** Discontinuous Groups. Lectures, supplemented by reading. Text: Dickson, *Galois' Theory*. *Three hours.* Hours to be arranged. Alternate years. Dr. AMES.

13a. **Fourier's Series and Allied Series.** Lectures, supplemented by reading. *Three hours.* Hours to be arranged. Alternate years. Assistant Professor KELLOGG.

13b. **Potential Function.** Introduction to mathematical physics. Lectures, supplemented by reading. *Three hours.* Hours to be arranged. Alternate years. Assistant Professor KELLOGG.

14. **Theory of Functions of Real Variables.** Higher Analysis, including the most important features of mathematical analysis, in a comprehensive but elementary manner. Lectures, supplemented by reading. References: Pierpont, *Theory of Functions of Real Variables*; Goursat; Whittaker; Vallee-Poussin; Serret-Bohlmann; Stolz, etc. *Three hours.* Hours to be arranged. Alternate years. Not given 1906-7. Professor HEDRICK.

15. **Function Theory.** First course. A general course, covering the theories of Riemann, Cauchy, and Weierstrass, in their elementary phases. Theory of Functions of a Complex Variable. Elliptic Functions. References: Burchardt; Durege; Klein; Picard; Borel, etc., and *Ency. der Math. Wiss.*, II. *Three hours.* Hours to be arranged. Alternate years. Given 1906-7. Professor HEDRICK.

16. **Theory of Differential Equations.** To be preceded by course 7a. First semester, ordinary differential equations; second semester, partial differential equations; these may be elected or given separately. *Three hours.* Hours to be arranged. Alternate years. Dr. WESTFALL.

17a. **Theory of Groups.** General course. *Three hours.* Hours to be arranged. Alternate years. Dr. AMES.

17. **Lie's Theory of Continuous Groups, with applications to Differential Equations and Contact Transformations.** Lectures, based on Lie's Works. *Three hours.* Hours to be arranged. Alternate years. Dr. AMES.

18a or b. **Partial Differential Equations of Mathematical Physics.** Naturally follows courses 13a and 13b. *Three hours.* Hours to be arranged. Alternate years. Assistant Professor KELLOGG.

19. **Theory of Numbers.** The first semester will deal with the Classical Theory, the second with Algebraic Numbers; these may be elected or given separately. *Three hours.* Hours to be arranged. Assistant Professor KELLOGG.

20. **Analytical Mechanics.** This course is open only to students who have taken course 7a and b. *Three hours.* Hours to be arranged. Professor DEFOE. (Alternate years). Given in 1905-6.

21a or b. **Integral Equations.** *Three hours.* Hours to be arranged. Dr. WESTFALL.

22a or b. **Theory of Groups.** Second course. *Three hours.* Hours to be arranged.

23. **Theory of Functions.** Second course, to be preceded by course 14. *Three hours.* Hours to be arranged. Professor HEDRICK.

24a or b. **Foundations of Geometry and Non-Euclidean Geometry.** *Three hours.* Hours to be arranged.

25a or b. **Calculus of Variations.** *Three hours.* Hours to be arranged.

26a or b. **Theory of Differential Equations.** Second course. *Three hours.* Hours to be arranged.

27a or b. **Theory of Sound [or Heat.]** *Three hours.* Hours to be arranged. Assistant Professor KELLOGG.

28. **Differential Geometry.** Second Course on Theory of Surfaces. *Three hours.* Hours to be arranged.

29a or b. **Theory of Algebraic Invariants.** *Three hours.* Hours to be arranged. Dr. AMES.

30. **Research Courses.** The professors and instructors will conduct research work in private with students who desire to do advanced work along special lines. These courses may only be undertaken with the very special advice of the professor in charge. Any number of hours sanctioned by the professor in charge may be entered, according to the nature and amount of work undertaken, and the course may be re-elected repeatedly for work in different years.

Mathematical Journal Club. The members of the department, and others who desire, will form a club for the examination of current literature and for the discussion of mathematical topics. Meetings will be held and reports made each week on a set day. Criti-

cism and comment will then follow; and any subject of interest to the members of the Club will be discussed as occasion arises.

For Undergraduates and Graduates.

5. **Second Course in Calculus.** This course should be elected by all who have reasonably succeeded in course 3 or 4 (E), who desire to continue mathematical work through another year. It will deal with questions necessarily omitted or treated hurriedly in the first course on Calculus. Goursat's Course in Mathematical Analysis will be used as a text, with explanatory lectures. *Three hours.* Hours to be arranged. Professor HEDRICK.

6a. **Theory of Equations and Determinants.** Recitations, supplemented by lectures, using a standard text. This course includes special work on advanced algebra. To be elected only with or after course 3 or 4. *Three hours.* Hours to be arranged. Assistant Professor KELLOGG.

6b. **Advanced Analytic Geometry.** Recitations, supplemented by lectures. The applications of the calculus and extensions, of the elementary course on analytic geometry, including solid geometry. To be elected only with or after course 3 or 4, but independently of course 6a. *Three hours.* Hours to be arranged. Dr. AMES.

7a. **Elements of Differential Equations.** Recitations, supplemented by reading. Text: Murray, Differential Equations. Open to those who have taken course 3 or 4. *Three hours.* Hours to be arranged. Dr. WESTFALL.

7b. **Elements of Analytical Mechanics.** Open to those who have taken course 3 or 4. *Three hours.* Hours to be arranged. Dr.

8a. **Elements of Differential Geometry.** Lectures. Introduction to the theory of modern differential geometry. Reference books: Joachimsthal; Niewenglowski; Bianchi; Darboux. Naturally follows either course 5 or 6b. *Three hours.* Hours to be arranged. Dr. AMES. [Alternate years.]

8b. **Elements of Projective Geometry.** Lectures, supplemented by reading. Reference books: Emch, Projective Geometry; Reye, Geometrie der Lage; Scott, Modern Geometry. Election independent of course 8a. *Three hours.* Hours to be arranged. Dr. WESTFALL. [Alternate years.]

9a or b. **Mathematical Laboratory.** A regular class will be conducted (if desired by a sufficient number) in the construction of

mathematical models, with explanatory lectures. *Three hours.* Hours to be arranged. (No credit can as yet be assigned for this work.) Professor HEDRICK and Mr.——.

10a or b. **History of Mathematics.** *Three hours.* Hours to be arranged. This course will be given if desired by a sufficient number of persons qualified to enter it. Mr.——.

11a or b. **The Mathematical Theory of Probability, with Applications to Life Insurance and Statistics.** This course will now be given regularly if elected by three students. *Three hours.* To be arranged. Mr.——.

For other courses on mathematical topics see also the announcements of the Teachers College, the School of Engineering, and the department of Physics.

PHILOSOPHY AND EXPERIMENTAL PSYCHOLOGY.

PHILOSOPHY.

Acting Assistant Professor ELKIN (*in charge*).

Primarily for Graduates.

8. **Seminary in the History of Philosophy.** Kant's Theory of Knowledge. An examination and criticism of Kant's *Kritik der reinen Vernunft*. This course is open only to students who have had the necessary preparation in Logic, Psychology, Ethics and the History of Philosophy, and possess a reading knowledge of German. *Three times a week.* Hours to be arranged.

9. **Advanced Ethics.** A critical study of modern ethical theories, with a view to reaching an independent philosophy of conduct. T. Th., at 2.

For Undergraduates and Graduates.

7. **The Problems of Philosophy.** A consideration of the fundamental problems of philosophy, and their solution. The following subjects will be taken up: The nature of philosophy; its relation to the sciences and religion; materialism; dualism; spiritualism; parallelism and monism; atomism; mechanism; evolutionism; theism; pantheism; empiricism; rationalism; scepticism; realism; idealism. M. W., at 11:30.

EXPERIMENTAL PSYCHOLOGY.

Professor MEYER; Mr. SISSON.

Primarily for Graduates.

7. Psychological Seminary and Advanced Laboratory Work. Critical reading of recent literature. Discussion of special problems and theories. Research work.

For Undergraduates and Graduates.

These courses are open only to students who have had an introductory course in General Psychology.

2b. Experimental Didactics. Application of the methods of the psychological laboratory to problems of instruction and training. *Three times a week.*

3b. Differential Psychology. A study of individual differences in character and intelligence and their causes. *Three times a week.*

4a, 4b. Aesthetics (Psychological Theory of Art.) First semester: General Aesthetics on a Psychological Basis. Second semester: Psychological Theory of Music. Either one of these semester courses may be taken alone. T. Th. S., at 3.

5a. Advanced Psychology. Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. *Three times a week.*

6b. Comparative Psychology. Mental development in the child and the race. Experimental methods of child study. Dawning intelligence during animal infancy. Experiments upon the mental processes of animals. Instinct and psychical heredity. Theories of mental evolution. *Three times a week.*

Psychological Laboratory.

The psychological laboratory is well equipped with instruments. It consists of 10 rooms, all connected by telephone wires, furnished with gas and electricity and four with water. The rooms are used for the purposes indicated: One office, one lecture room, one work shop, one room for the study of animals, one dark room for optical work, one room for work on odor and taste chiefly, three rooms for work on visual, auditory and other sensations and experiments in general, one dark room used for storage only.

PHYSICS.

Professor STEWART; Mr. PROCTOR; Dr. REESE.

Primarily for Graduates.

5. **Theory of Light.** *Three times a week.* M. W. F., at 8. Professor STEWART.

6. **Theory of Heat.** *Three times a week.* Mr. PROCTOR.

7. **Theory of Electricity and Magnetism.** *Three times a week.* M. W. F., at 8. Professor STEWART.

10. **Seminary.** Critical reading and discussion of current research work in Physics. A colloquium in which all members of the teaching staff of the department and students of sufficient attainments take part. *Once a week.* M., at 4.

11. **Research Work.** Hours to be arranged. Professor STEWART.

15. **Theory of Vibrations.** *Twice a week.* Lectures. Dr. REESE.

For Undergraduates and Graduates.

4. **Electrical Measurements.** *Two or three times a week.* Lectures, M., 9. Laboratory, W. Th., 1:30-4. A knowledge of Calculus is required. Professor STEWART.

12. **Heat and Light.** *Three times a week.* Open to those who have completed course 1 or its equivalent. T. Th. S., at 8. Mr. PROCTOR.

13. **Electricity and Magnetism.** *Three times a week.* Open to those who have completed course 1 or its equivalent.

Courses 12 and 13 are intended for those who desire work of less mathematical character than courses 5, 6 and 7. These courses are recommended to those preparing to teach in Secondary Schools.

9. **Advanced Work in General Physics.** This course, largely laboratory work, will be adapted to meet the needs and attainments of the individual student. The student may be assigned a definite problem, the literature of which must be studied and the experimental work performed with the care of original research. *Two to six times a week.* Professor STEWART and Mr. PROCTOR. M. W. F., at 1:30-4.

PHYSIOLOGY.

Professor GREENE; Assistant Professor KOCH.

Primarily for Graduates.

5. **Advanced Physiology.** Advanced course in Physiology, Pharmacology, or Physiological Chemistry, open to students who have completed courses 2, 3b, or 4b respectively. Hours to be arranged.

6. **Physiological Seminary and Journal Club.** T., at 9.

7. **Investigation.** Opportunity is here offered for research into questions of current interest in physiology, pharmacology, physiological chemistry. Problems will be assigned according to the individual needs of the student. Hours to be arranged.

For Undergraduates and Graduates.

2a. **Comparative Physiology.** The principles of Physiology illustrated by the simpler forms of life. Lecture, Th., at 9; Laboratory, W., 1:30 to 4.

3b. **Pharmacology.** This course presents the physiological action of chemicals. The laboratory experiments are distributed to groups of students and each group is required to demonstrate to other members of the course. Lecture, M. W. F., at 8; Laboratory, M. W. F., 9 to 12. April 1, to end of semester, two hours' credit. Open to students who have had course 1.

4b. **Physiological Chemistry.** The Chemistry of the cell, from the point of view of energetics and the fundamental laws of physical chemistry, together with the chemical structure of all the cell constituents as far as known. *One lecture and two laboratory periods a week.* Hours to be arranged.

POLITICAL SCIENCE AND PUBLIC LAW.

Professor LOEB.

Primarily for Graduates.

5. **Comparative Administrative Law.** A study of the nature and functions of the administration and the control over it in the United States, England, France, and Germany. Governmental structure will be studied in detail and local government will be considered with special reference to recent development. W. F., at 3.

6a. **Municipal Government.** A sketch of the history of municipalities followed by a study of the organization and functions of cities in Europe and in the United States. May be omitted in 1906-7. *Twice a week.* Hours to be arranged.

7b. **The Law of Taxation.** A study of the legal rules regulating taxation in the central and commonwealth governments of the United States. Should be preceded by Economics 3a. May be omitted in 1906-7. *Twice a week.* Hours to be arranged.

8a. **The Government of Missouri.** A study of the constitutional development of the state from the Louisiana Purchase to the present time, followed by a consideration of the organization and functions of the institutions of the central and local governments. T. Th. at 2.

10. **Seminary in Administration.** A course for the investigation of administrative organization and functions. In 1906-7 topics in Missouri administration will be studied from the sources. *May be elected for two, three or four hours.*

For Undergraduates and Graduates.

3b. **Elements of Jurisprudence.** An introduction to the study of law. This course treats of the nature, sources and classification of law, and includes a consideration of the fundamental concepts of private law. The nature and use of legal authorities will be discussed. T. Th., at 2.

4. **Comparative Constitutional Law.** A comparative study of the constitutional law of the principal states of Europe and America. Particular attention will be given to the field of individual liberty defined in the Constitution of the United States and interpreted in the decisions of the Supreme Court. *Three times a week.* T. Th., at 3. One additional hour to be arranged.

ROMANCE LANGUAGES.

Professor WEEKS; *Miss WILLIAMS; Dr. EVERS; Miss BEDFORD.

FRENCH.

Primarily for Graduates.

11. **The Sixteenth Century.** Lectures, readings, and reports. The course includes the period between the close of the literature of the Middle Ages and the first years of the seventeenth century, with especial attention to the intellectual forces set in motion by the Renaissance and the Reformation in France. The first semester will be given to a general survey of the period in question. The second semester will deal chiefly with Montaigne and Rabelais, making a careful study of selected portions of their works, and of the influence and significance of their thought. T. Th. S., at 2. Dr. EVERS.

12. **Old French.** Paris and Langlois' *Chrestomathie*. A study in text criticism will be made of the manuscripts of *Guibert d'Andrenas*. The course is conducted in French. Although this course is intended

*Absent during session of 1905-6.

for Graduates, Seniors who have taken with high credit the preceding work and who are making a specialty of Romance Languages, are occasionally allowed to elect it, since it can be pursued advantageously for two successive years. M. W. F., at 9:30. Professor WEEKS.

PROVENÇAL.

14b. **Provençal.** The books used will be Grandgent's *Old Provençal*, Heath & Co., 1905, and Crescini, *Manualetto Provenzale*, Padua, 1905. Restori's *Histoire de la littérature provençale* will also be useful to those taking the course. T. Th. S., at 2. Professor WEEKS.

For Undergraduates and Graduates.

8. **General View of French Literature.** A great deal of ground is covered in this course; much reading is done, very little translation. The first semester is devoted to the 17th and 18th centuries, the second to the 19th. One or more plays of each of the great classical dramatists are read, together with masterpieces in other branches of literature. T. Th. S., at 9:30. Professor WEEKS.

9. **French Literature in the Eighteenth Century.** Lectures, readings and reports. The first semester is occupied with the study of Voltaire and his contemporaries, chiefly the former—his life and character, his ideas and aims, and the nature and extent of his influence in France and abroad. The second semester treats of the drama of the period, tracing its evolution from Racine to the death of Beaumarchais. M. W. F., at 10:30. Dr. EVERS.

10. **The Seventeenth Century.** An attempt is made in this course to obtain a general view of the classic period of French Literature. Especial attention is paid to the development of French prose. There is considerable outside reading, with written reports from time to time. Selections from nearly all the great writers of the seventeenth century will be read. T. Th. S., at 10:30. Professor WEEKS.

Courses 9 and 10 are given in alternate years.

ITALIAN.

For Undergraduates and Graduates.

16. **Advanced Course.** The Sixteenth Century and Dante. Open to Seniors and Graduates who have had at least two years of French, and who possess a fluent reading knowledge of modern Italian. The purpose of this course is to take as comprehensive view as is practicable of the classical literature of Italy. The work studied will be mostly verse,

but outside prose reading will be expected. During the first semester Machiavelli's *Il Principe*, Tasso's *Gerusalemme Liberata*, and portions of Ariosto's *Orlando Furioso* will be read. The second semester will be devoted mainly to the study of Dante and the *Divina Commedia*. T. Th. S., at 9:30. Miss BEDFORD.

PHONETICS.

Primarily for Graduates.

20a. **General Introduction to Philology.** An effort is made in this course to study the phenomena of speech sounds from a physiological standpoint. The University has established a laboratory of Experimental Phonetics for the more accurate study of the living speech. M. W. F., at 2. Professor WEEKS.

21. **Seminary.** An opportunity is here given for advanced work in special subjects. *Twice a week.*

SOCIOLOGY.

Professor ELLWOOD; Dr. ————.

Primarily for Graduates.

9a. **Advanced Sociology.** A critical study of sociological theory. Lectures, discussions, and theses by the class. T. Th. S., at 11:30. Professor ELLWOOD.

10b. **Psychological Sociology.** A critical study of the writings of Tarde, Le Bon, and Baldwin, with some attempt to make use of psychological principles in the interpretation of social phenomena. T. Th. S., at 11:30. Professor ELLWOOD.

11a. **Ethnology.** A study of the evolution and relation of the different races of mankind. M. W. F., at 10:30. Professor ELLWOOD.

12b. **Ethnic Psychology.** A study of the comparative psychology of races as shown in their customs, institutions, and social organization. M. W. F., at 10:30. Professor ELLWOOD.

13a. **The American Negro.** A study of the social, economic, moral, and educational conditions among the negroes of the United States. *Three times a week.* Hours to be arranged. Dr. ————.

14b. **History of Social Philosophy.** Lectures on the development of social thought from Aristotle to the present, especially since the time of Comte. Assigned reading. M. W. F., at 2. Professor ELLWOOD.

15. **Seminary.** Research work along sociological and philanthropic lines. *Two, three, or four hours.* Professor ELLWOOD and Dr. ————.

For Undergraduates and Graduates.

3a. **Modern Philanthropy.** A study of the nature and origin of the dependent and defective classes, the principles and methods of relief, the management of institutions, etc. Reports by the class on special subjects for investigation. Additional work will be required of graduate students. T. Th. S., at 9. Professor ELLWOOD.

4b. **Criminal Sociology.** A study of the causes, nature, and treatment of crime; the principles of criminal anthropology, criminal jurisprudence, and penology. Lectures and selected textbooks. Additional work will be required of graduate students. T. Th. S., at 9. Professor ELLWOOD.

5a. **History of Philanthropy and the Poor Law.** *Three times a week.* Hours to be arranged. Dr. ———.

6 or 6b. **Advanced Problems in Charities and Correction.** *Three times a week.* Hours to be arranged. Dr. ———.

7a. **Rural Communities.** A study of the social conditions in American agricultural communities with a view to their improvement. *Three times a week.* Hours to be arranged. Dr. ———.

8b. **Urban Communities.** A study of the social conditions in American urban communities, with special reference to the satisfying of communal needs. *Three times a week.* Hours to be arranged. Dr. ———.

ZOOLOGY.

Professor LEFEVRE; Assistant Professor CURTIS.

Primarily for Graduates.

8. **Research.** Special investigation of unsolved problems of Zoology in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is required. Hours to be arranged in accordance with the requirements of individual students.

9. **Seminary.** Meetings at which subjects of zoological investigation are reported and discussed by instructors and students. Each student is required to give at least six lectures during the year, and experience is thus gained in presenting in the form of lectures, the results of reading and research. For the session of 1906-7 the following subjects will receive special attention in the work of the Seminary:

evolution and adaptation, and the behavior of organisms. A reading knowledge of French and German is required. *Twice a week.* Hours to be arranged.

For Undergraduates and Graduates.

5a. **Embryology of Invertebrates.** A study of the development of representative forms from the principal phyla of the invertebrates. Lectures and laboratory, M. W. F., 10:30-12:30. Assistant Professor CURTIS.

6. **Cytology.** A study of the cell, with special reference to problems of development and inheritance. Cytological technique. Lectures and laboratory, T. Th. S., 10:30-12:30. Professor LEFEVRE.

7a. **Principles of Zoology.** A course of lectures treating of the main principles underlying zoological science. Emphasis is laid upon the problems of variation, heredity, evolution, and adaption. Collateral reading in the writings of Darwin, Wallace, Romanes, Weismann, Brooks, Galton, Mendel, de Vries, and others. W. F., at 11:30. Professor LEFEVRE.

For further information concerning the graduate work of the Academic Department address the Chairman of the Graduate Conference.

II. TEACHERS COLLEGE.

The regulations concerning the degrees of Master of Arts and Doctor of Philosophy are essentially the same as those laid down by the Academic Department.

Before being admitted to candidacy for a Graduate Degree from the Teachers College, the student must give evidence of sound general knowledge of the history and theory of education, and must have had considerable experience in teaching.

All graduate students in the Teachers College, whether candidates for a degree or not, must make Education their major subject, but they may elect such related work as may be approved by the Head Professor of Education.

EDUCATION.

Professor HILL; Professor GRAVES; Professor MERIAM; Assistant Professor COURSAULT; Mr. ELLIFF.

Primarily for Graduates.

40. **Philosophy of Education.** The purpose of this course is to give insight into the significance of education as a conscious effort towards human evolution by a study of its relation to the life process, and thus, by giving clearer insight into the aims and methods of education, help to make educational practice a rationalized endeavor rather than a mere routine. This course is open only to students who have had training in philosophy. *Three times a week.* Assistant Professor COURSAULT.

41. **Seminary in Educational Psychology.** The special problems selected for study will depend upon the interests of those taking the course, the aim being to guide advanced students of Education in constructive work in the theory of education through a detailed study of a few aspects of mental development. The course is open only to students who have had considerable training in both Education and Psychology. *Twice a week.* Professor HILL.

42. **Seminary in the History of Education.** A critical investigation of topics in connection with the thesis work for the graduate degrees. *Twice a week.* Professor GRAVES.

43. **Seminary in School Administration.** A research course in school organization and administration with special reference to city school systems. The course is open only to teachers of considerable

experience in school supervision who are otherwise qualified to undertake research work. *Twice a week.* Professor MERIAM and Mr. ELLIFF.

For Undergraduates and Graduates.

10a. **Educational Psychology.** This course aims to present the main facts concerning the development of the human mind from childhood to adolescence, with special reference to the meaning of these facts for the teacher. It presupposes an elementary knowledge of General and Comparative Psychology. T. Th. S., at 3. Professor HILL.

11b. **Principles of Education.** This course aims to develop the fundamental principles upon which educational procedure should rest, through a study of the psychological, sociological, and religious aspects of education. It presupposes a general knowledge of Psychology and of either Ethics or Sociology. T. Th. S., at 3. Assistant Professor COURSAULT.

12a. **Educational Classics.** A critical study of a few of the great classics in Education. Presupposes a knowledge of History of Education and Theory of Teaching. *Three times a week.* Professor GRAVES.

13b. **History of Education in the United States.** Research work on the development of the organization and administration of the public school systems of this country. *Twice a week.* Professor GRAVES.

14a. **Secondary Education.** A study of the historical development of secondary education, especially in the United States, and a consideration of the leading problems now confronting secondary education in America. *Three times a week.* Assistant Professor COURSAULT.

15b. **School Systems.** A comparative study of the school systems of Germany, France, England, Canada, and the United States. *Three times a week.* Professor GRAVES.

16b. **School Supervision.** The leading topics in school administration are discussed, such as: construction, heating, ventilation, lighting, sanitation, and equipment of school buildings; playgrounds; relations of superintendents to school boards, teachers, pupils, and citizens; grading, promotions, etc. *Three times a week.* Professor MERIAM and Mr. ELLIFF.

In addition to the above, a number of teachers' courses in Botany, English, German, etc., are open to seniors and graduates and may be counted as Education for the Bachelor's or Master's Degree.

For further information concerning the graduate work of the Teachers College, address Dean A. Ross Hill, Columbia, Missouri.

III. SCHOOL OF AGRICULTURE.

The College of Agriculture offers the Graduate Degrees of Master of Science in Agriculture and of Doctor of Philosophy.

Graduates of the College of Agriculture or of other colleges of equal standing, may be admitted to candidacy for Graduate Degrees.

Any graduate student in the College of Agriculture, before being admitted to candidacy for a Graduate Degree, must furnish to the Graduate Committee satisfactory evidence of fundamental knowledge of the principles of agriculture. This requirement will be adhered to, whether the student does his major and minor work in technical agricultural subjects or in other subjects offered in the College of Agriculture.

Candidates wishing to register in the College of Agriculture for a Graduate Degree should make their arrangements with the Graduate Committee which is charged with functions relative to the acceptance of candidates and arrangement for Graduate work, in consultation with the head professors of those subjects in which the work is chosen.

Candidates for the degree of Master of Science in Agriculture are required to do one year's graduate work at the University. This work must consist of at least 12 hours a week throughout the year, the subjects selected must be advanced courses, and must be approved by the Dean and the Graduate Committee. Not less than one-half of this work must be in a major subject and the remainder in one or two minor subjects. A majority of the hours devoted to this subject must be in courses designated "*Primarily for Graduates.*"

An acceptable dissertation, embodying the results of research in the major subject, is also required. The completed dissertation must be typewritten and filed with the Graduate Committee at least three weeks before the candidate's graduation.

The conferring of the degree of Doctor of Philosophy is not dependent upon the fulfillment of a definite time requirement. Scholarly attainments are required in the case of candidates for this degree, particularly in power of independent investigation, which must be evinced by the production of a dissertation embodying the results of original research or productive scholarship of a higher order.

However, not less than three years of graduate study, in connection with proper library and laboratory facilities, are required. At least one year, immediately preceding the conferring of the degree, must be spent in resident work at the University of Missouri. The Graduate Committee shall determine, in the case of any candidate,

what credit may be given for work done elsewhere. The candidate must give satisfactory evidence of his ability to read German and French.

The candidate is required to select a major subject for his principal work, and not less than one and not more than two minor subjects. No definite regulations are laid down as to the division of time between the major and minor subjects, but in general the candidate will be expected to devote two-thirds of his time to his major subject.

The head professors of the departments in which the candidate chooses his major and minor subjects shall take charge of his examinations and report the results to the Graduate Committee. An oral examination before the Agricultural Faculty may also be required.

Upon the satisfactory completion of work for an advanced degree, the candidate may be recommended by the Agricultural Faculty to the Board of Curators for the degree.

COURSES OF INSTRUCTION.

AGRONOMY.

Professor MILLER.

Primarily for Graduates.

1. **Special Investigations.** Original investigation of soils and plants, their inter-relations and the influence of these phenomena upon plant production. The special work undertaken will be determined by the preparation and needs of the student.

For Undergraduates and Graduates.

2. **Seminary.** Reading and discussion of recent and special investigations in soil fertility and plant production. Original papers on assigned topics will be presented for discussion. Each student will be expected to contribute at least four such papers during the year. A reading knowledge of French and German is recommended.

BOTANY.

Professor DUGGAR; Mr. REED; Dr. SHANTZ.

Primarily for Graduates.

12. **Research.** Problems for investigation may be assigned in any of the general lines of applied botanical work for which the student may be best prepared. Professor DUGGAR.

13. **Seminary.** The seminary offers to advanced students an opportunity to become familiar with current work in botany. Reports on appropriate topics will be required. Professor DUGGAR.

For Undergraduates and Graduates.

(This work is at present the same as in the Academic Department. See courses announced on page 26.)

ANIMAL HUSBANDRY.

Professor MUMFORD; Assistant Professor FORBES.

Primarily for Graduates.

1. **Animal Breeding.** Original research in connection with the methods and practices applicable to the improvement of domestic animals. Material for the study of inbreeding, cross breeding, telephony, etc., and the relation of these phenomena to breeding practice is available in the breeding laboratory at the farm. Professor MUMFORD.

2. **Zoometry. Animal Measurement.** Statistical study of variation in animal form, function and performance. This course gives to the advanced student opportunity for intimate acquaintance with special subjects in animal breeding. Assistant Professor FORBES.

DAIRYING.

Assistant Professor ECKLES (*in charge*).

Primarily for Graduates.

1. **Dairy Manufactures.** Investigation of unsolved problems in the manufacture of butter and cheese. This will be chiefly laboratory work and will be arranged to suit the needs of individual students.

2. **Dairy Bacteriology.** A study of certain problems in Bacteriology and their relations to Dairying, with a view to acquainting the student with the methods of research in this line.

For Undergraduates and Graduates.

3b. **Dairy Farming.** The selection, breeding and development of a dairy herd; the growing of crops for the dairyman; the use of the silo; a discussion of the problems of feeding for the production of milk; the marketing of dairy products; the utilization of the by-products of the dairy.

4a. **Dairy Bacteriology.** The contamination of milk, normal and abnormal fermentations; the use of pure cultures and starters; the spread of diseases through the use of milk. Lectures and laboratory work. *Three times a week.*

ENTOMOLOGY.

Professor STEDMAN.

Primarily for Graduates.

4. **Graduate Work in Entomology.** Laboratory Work. Monographing a group (scientific) monographing a species (scientific and economic). Hours to be arranged. Must be preceded by course 3.

For Undergraduates and Graduates.

3. **Advanced Entomology.** Lectures and laboratory work. Internal anatomy, histology, physiology, embryology, breeding, life histories, habits, economy, distribution, dimorphism, mimicry, determination of species, classifications, ecology, methods, literature, distribution, legislation. Hours to be arranged.

HORTICULTURE.

Professor WHITTEN; †Assistant Professor HOWARD; Acting Assistant Professor SHAW.

Primarily for Graduates.

7. **Special Investigation.** This course is intended for graduates and advanced students. Special topics for investigation will be assigned. Hours by appointment. Professor WHITTEN.

For Undergraduates and Graduates.

4b. **Origin and Development of Varieties of Cultivated Plants.** Lectures and assigned readings. A discussion of the principles underlying the theory and practice of the modification and improvement of cultivated plants. M. W. F., at 9:30. Professor WHITTEN.

†Absent during session of 1905-6.

VETERINARY MEDICINE.

Professor CONNAWAY; Assistant Professor TIFFANY.

Primarily for Graduates.

1. **Experimental Study of the Contagious and Infectious Diseases of farm animals**, such as tuberculosis, glanders, hog cholera, Texas fever, rabies, etc. The students will make inoculations, study and record clinical phenomena, make post mortems, preserve the diseased tissues and study them microscopically. A study of the literature of each disease is also required. Open to graduate veterinarians, who may be interested in inspection and quarantine work; also to Agricultural and Medical students who have completed the required work in Histology, Physiology, Bacteriology and Pathology offered in the Medical Department.

2. **Experimental Study of Veterinary Remedies.** This course is intended for Veterinary practitioners who desire to make a study of the physiological action of medicines on the various farm animals, as well a study of therapeutic action.

3. **Investigation.** Students who have suitable preparations will have an opportunity to assist in the Experiment Station work.

For further information concerning the graduate work of the School of Agriculture, address the Dean of the School of Agriculture.

IV. SCHOOL OF ENGINEERING.**Admission.**

The requirement for admission to candidacy for advanced degrees in Civil Engineering, Electrical Engineering and Mechanical Engineering is the undergraduate degree of Bachelor of Science in Civil Engineering, Electrical Engineering, or Mechanical Engineering respectively, from this University, or an equivalent degree.

Degrees.

Candidates for the degrees of Civil Engineering (C. E.), Electrical Engineering (E. E.), or Mechanical Engineering (M. E.), must complete satisfactorily one year of graduate work in residence, or two years of professional practice and graduate work *in absentia*, the equivalent of twelve hours University credit, and present an acceptable thesis.

The thesis subject shall be presented to the dean of the School of Engineering on or before December 1, and the thesis itself on or before May 1 of the given year. The graduate work is under the direct charge of the heads of the respective departments.

Fellowships, Fees and Expenses.

For statement in regard to fellowships, see page 18.

For statement in regard to fees and expenses, see page 17.

Buildings.

There are two buildings devoted to instruction in Engineering: the Mechanic Arts Building containing the shops and drawing rooms, and the Engineering Buildings with lecture rooms, drawing rooms, and engineering laboratories, including apparatus rooms for surveying instruments, testing laboratory, dynamo laboratory for electrical measurements, laboratory for testing qualities of materials used in electrical construction, steam engine laboratory, hydraulic laboratory, and laboratory for the testing of materials used in Mechanical Engineering.

These laboratories are fairly well equipped and apparatus is continually being added.

Libraries.

The School of Engineering has a carefully selected and arranged library. Students also have access to the general library (see page 21.)

COURSES OF INSTRUCTION.

CIVIL ENGINEERING.

Professor SPALDING; Assistant Professor WILLIAMS; Assistant Professor HYDE.

For Graduates.

31. **Railway Engineering.** Special advanced course in construction, maintenance and management. Hours to be arranged. Assistant Professor WILLIAMS.

32. **Bridge Engineering.** Problems in theory and design of framed structures. Hours to be arranged. Assistant Professor HYDE.

33. **Sanitary Engineering.** Investigations and special problems in sanitary science. Hours to be arranged. Professor SPALDING.

34. **Hydraulic Engineering.** Problems in hydraulics, irrigation, river and harbor improvements. Hydraulic construction. Hours to be arranged. Professor SPALDING.

35. **Concrete Structures.** Theory of re-enforced concrete. Special laboratory investigations. Hours to be arranged. Professor SPALDING and Assistant Professor HYDE.

ELECTRICAL ENGINEERING.

Professor SHAW; Mr. FLOWERS.

For Graduates.

8. **Design.** Special problems; thorough study and design of a single piece of apparatus, such as an induction motor, direct current generator, or rotary. Hours to be arranged. Mr. FLOWERS.

9. **Telephony and Telegraphy.** Apparatus and systems. Lines: their properties, with special reference to effects of inductance and capacity. Wireless telegraphy. Hours to be arranged. Professor SHAW.

10. **Long Distance Transmission.** A thorough study of details. Hours to be arranged. Professor SHAW.

11. **Electric Railway Engineering.** Street, interurban and high speed electric railroading. Electric railway economics. Hours to be arranged. Mr. FLOWERS.

12. **Storage Battery Engineering.** Hours to be arranged. Professor SHAW.

13. **Electrical Engineering Economics.** Hours to be arranged. Professor SHAW.

14. **Research.** Work and hours to be arranged to suit individuals. Professor SHAW and Mr. FLOWERS.

MECHANICAL ENGINEERING.

Professor GREENE; Mr. FESSENDEN.

For Graduates.

21. **Generation of Power.** Advanced work in the theory and design of steam, gas and oil engines, air compressors and motors, steam turbines and hydraulic motors. Hours to be arranged. Professor GREENE.

22. **Transmission of Power.** Study of the methods of the transmission of power, heating, lighting, and the arrangement of shops, plants, industrial institutions and towns. Transportation of materials. Hours to be arranged. Professor GREENE.

23. **Advanced Laboratory Work.** Analysis of fuels and oils. Physical characteristics of metals. Thermodynamics of heat engines.

Tests of complete plants. Original investigations. Hours to be arranged. Professor GREENE.

24. **Railway Engineering.** Design, construction and operation of motive power, rolling stock and the auxiliary apparatus employed. Hours to be arranged. Professor GREENE.

25. **Kinematics and Machine Design.** Advanced work in kinematics and the design of apparatus for specific work. Hours to be arranged. Mr. FESSENDEN.

26. **Refrigeration.** Advanced work in the lay-out and operation of plants for refrigeration. Hours to be arranged. Professor GREENE.

27. **Engineering Office Work.** Keeping costs, estimates, organization of shop advertising. Hours to be arranged. Professor GREENE and Mr. FESSENDEN.

For further information concerning the graduate work of the School of Engineering, address, the Junior Dean of the School of Engineering.

THE LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

UNIVERSITY OF ILLINOIS
LIBRARY OF AGRICULTURE
AND MECHANICAL ARTS

UNIVERSITY OF MISSOURI

ANNOUNCEMENT

OF THE

GRADUATE DEPARTMENT

1907-1908



COLUMBIA, MISSOURI

UNIVERSITY CALENDAR

| | |
|--|-----------------------------------|
| 1907—April 4 | Quarterly Meeting of the Curator |
| May 27 to June 1..... | Final Examinations |
| June 1, Saturday.. .. | Stephens Medal Contest |
| June 2, Sunday..... | Baccalaureate Sermon |
| June 3, Monday..... | Class Day |
| June 4, Tuesday... .. | Alumni and Phi Beta Kappa Day |
| June 5, Wednesday..... | Annual Meeting of the Curator |
| June 5, Wednesday..... | Commencement Day |
| June 8, Saturday | Summer Session Begins |
| August 9, Friday..... | Summer Session Closes |
| September 9-11..... | Entrance Examinations |
| September 9, Monday..... | All Departments Open |
| November 27, Wednesday, 4 p. m., to December | |
| 2, Monday, 8 a. m. | Thanksgiving Holiday |
| December 10, Tuesday..... | Semiannual Meeting of the Curator |
| December 21, Thursday, at 4 p. m., to | } Christmas Holidays |
| 1908—January 3, Friday, at 8 a. m., | |
| January 20-25. | Mid-Year Examinations |
| January 27-29 | Entrance Examinations |
| January 27, Monday..... | Second Semester Begins |
| April 2..... | Quarterly Meeting of the Curator |
| May 25-30..... | Final Examinations |
| May 30, Saturday..... | Stephens Medal Contest |
| May 31, Sunday | Baccalaureate Sermon |
| June 1, Monday | Class Day |
| June 2, Tuesday..... | Alumni and Phi Beta Kappa Day |
| June 3, Wednesday..... | Annual Meeting of the Curator |
| June 3, Wednesday..... | Commencement Day |

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' 07-08

THE GRADUATE DEPARTMENT.

OFFICERS OF INSTRUCTION AND ADMINISTRATION.

Names are printed in the several groups in the order of appointment.

PRESIDENT OF THE UNIVERSITY.

RICHARD HENRY JESSE, LL. D.,

President, and Professor of Ancient and Mediaeval History.

Student, University of Virginia, 1873-5 and part of 1878; Dean of the Academic Department, University of Louisiana, 1878-84; Professor of Latin, Tulane University, 1884-91; studied in Europe part of 1885 and of 1890; LL. D., Tulane University, 1891; Member of "Committee of Ten," 1892-3; Member of Administrative Board, Congress of Arts and Science, Louisiana Purchase Exposition, St. Louis, 1904; LL. D., University of Wisconsin, 1904; LL. D., South Carolina College, 1905; awarded Commemorative Diploma and Medal "In recognition of distinguished services to Education," Louisiana Purchase Exposition, St. Louis, 1904; President of National Association of State Universities, 1905-6; delegate from the United States to First International Congress of Radiology in Belgium, summer of 1905; studied in University of Munich, Spring and Summer Semester, 1905, and in University of Berlin, Fall and Winter Semester, 1905-6; LL. D., Missouri Valley College, 1906; President of the University of Missouri, 1891—.

PROFESSORS.

PAUL SCHWEITZER, Ph. D., LL. D.,

Professor of Agricultural Chemistry, and Chemist to the Experiment Station.

Student under Schneider, Sonnenschein, and H. Rose, at Berlin, 1858-60; Chemist to the Soda Ash Works, Schoeningen, 1860-2; Chemist to the Chemical Works at Detmold, 1862-3; Assistant Professor of Chemistry, Polytechnic Institute, Philadelphia, 1864-6; Assistant in School of Mines, Columbia College, 1866-72; Ph. D., University of Goettingen, 1869; LL. D., University of Missouri, 1897; Professor in the University of Missouri, 1872—.

EDWARD ARCHIBALD ALLEN, Litt. D.,

Professor of English Language and Literature.

Student, Randolph-Macon College, 1861-62, University of Virginia, 1866-68; Professor of Latin and Greek, Farmville College (Va.), 1873-81; Professor of English and Modern Languages, Central College, 1881-5; Litt. D., Washington and Lee University 1890; Professor of English, University of Missouri, 1885—.

WILLIAM GWATHMEY MANLY, A. M.,

Professor of Greek Language and Literature.

Student, University of Virginia, 1882-4; Assistant Head Master, McCabe's University School, 1884-6; Professor of Greek, Mercer University, 1886-9; A. M., Harvard University, 1890; American School of Classical Studies at Athens, and traveling in Greece, 1900; Student, University of Berlin, 1904; Professor of Greek, University of Missouri, 1890—.

JOHN CARLETON JONES, A. B., Ph. D.,

Professor of Latin Language and Literature, and Dean of the Academic Faculty.

A. B., Westminster College, 1879, A. M., 1882, Ph. D., 1891, Professor of Latin, 1880-2; Graduate Student, Johns Hopkins University, 1882-3; Assistant Professor of Latin and Greek, University of Missouri, 1883-7, Associate Professor of Latin, 1887-91; Student, University of Leipzig and at Rome, 1895-6, University of Munich, 1903-4; Acting President, University of Missouri, 1905-6, Professor of Latin, 1891—, Dean of Academic Faculty, 1900—.

JOHN WALDO CONNAWAY, D. V. S., M. D.,

Professor of Veterinary and Comparative Medicine, and Veterinarian to the Experiment Station.

D. V. S., Chicago Veterinary College, 1890; M. D., University of Missouri, 1891; Student, Johns Hopkins University, 1894-5, in Germany, 1904-5; Professor of Physiology, University of Missouri, 1891-7, Professor of Physiology, and Veterinarian to the Experiment Station, 1897-1900, Professor of Comparative Medicine, and Veterinarian to the Experiment Station, 1900—.

JOHN PICKARD, A. B., A. M., Ph. D.,

Professor of Classical Archaeology and History of Art, and Curator of the Museum of Classical Archaeology.

A. B., Dartmouth College, 1883, A. M., 1886; Student, University of Leipzig, 1889, University of Berlin, 1890, 1895, American School of Classical Studies in Athens, 1890-1, University of Munich, 1891-2; Ph. D., University of Munich, 1892; Student, American School of Classical Studies in Rome, 1901-2; Acting Dean of the Academic Faculty, University of Missouri, 1904-5, Professor of Classical Archaeology, 1892—.

JOHN CHARLES WHITTEN, B. S., M. S., Ph. D.,

Professor of Horticulture, and Horticulturist to the Experiment Station.

B. S., South Dakota Agricultural College, 1891, M. S., 1899, Instructor in Horticulture and Horticulturist (in charge) to the Experiment Station, 1892; Student, Cornell University, 1892; Assistant in Horticulture, Missouri Botanical Garden, 1893-4; Ph. D., University of Halle-Wittenberg, 1903; Professor of Horticulture, and Horticulturist to the Experiment Station, University of Missouri, 1894—.

HENRY JACKSON WATERS, B. S. A.,

Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station.

B. S. A., University of Missouri, 1886; Assistant Secretary, Missouri State Board of Agriculture, 1886-8; Assistant in Agriculture to the Missouri Experiment Station, 1888-91; Professor of Agriculture, Pennsylvania State College and Agriculturist to the Experiment Station, 1892-5; Director State Agricultural Exhibit, World's Fair, St. Louis, 1903-4; Student at the University of Leipzig, 1904-5; Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station, University of Missouri, 1895—.

BENJAMIN FRANKLIN HOFFMAN, B. L., M. L.,

Professor of Germanic Languages.

B. L., University of Missouri, 1884, M. L., 1888, Assistant Professor of Modern Languages, 1887-92; Student, Paris and Munich, 1892-3, University of Chicago, Summer Sessions, 1894, '95, '97, University of Leipzig, 1902-3, Summer Session, 1906; Professor of Modern Languages, University of Louisiana, 1893-5; Professor of Germanic Languages, University of Missouri, 1895—.

FREDERICK BLACKMAR MUMFORD, B. S., M. S.,

Professor of Animal Husbandry, in charge of Animal Husbandry Department in Experiment Station.

B. S., Michigan Agricultural College, 1891, M. S., 1893; Assistant in Michigan Agricultural Experiment Station, 1891-5; Assistant Professor of Agriculture, Michigan Agricultural College, 1893-5; Student, University of Leipzig, 1900, Zurich, 1901; Professor of Agriculture, University of Missouri, 1895-1904, Acting Dean of the College of Agriculture and Mechanic Arts, and Acting Director of the Experiment Station, 1903-5, Professor of Animal Husbandry, 1904—, in charge of Animal Husbandry Department in Experiment Station, 1906—.

JOHN MOORE STEDMAN, B. Sc.,

Professor of Entomology, and Entomologist to the Experiment Station.

B. Sc., Cornell University, 1888, Instructor in Invertebrate Zoology, and Entomology, and Assistant Entomologist to the Experiment Station, 1888-90; Biologist to the United States Department of Agriculture, 1890-91; Professor of Biology, Trinity College, 1891-3; Professor of Biology, Alabama Polytechnic Institute, Agricultural and Mechanical College, and Biologist to the Experiment Station, 1893-5; Professor of Entomology, and Entomologist to the Experiment Station, University of Missouri, 1895—.

RAYMOND WEEKS, A. B., A. M., Ph. D.,

Professor of Romance Languages.

A. B., Harvard University, 1890, A. M., 1891, Ph. D., 1897; Instructor in French, University of Michigan, 1891-3; Traveling Fellow, Harvard University (Paris and Berlin), 1893-5; Student at Paris, 1904-5; Professor of Romance Languages, University of Missouri, 1895—.

WILLIAM GEORGE BROWN, B. S., Ph. D.,

Professor of Chemistry, and Director of the Laboratories.

Miller Scholar, University of Virginia, 1875, B. S., 1877; Professor of Chemistry, East Tennessee University, 1877-8; Professor of General and Agricultural Chemistry University of Tennessee, 1878-80, Professor of Chemistry and Mineralogy, 1880-3; Student, University of Heidelberg, 1880-1; Instructor in Chemistry, University of Virginia, 1883-5; Morgan Fellow, Harvard University, 1884; Professor of Chemistry and Physics, South Carolina Military Academy, 1885-6; Professor of Chemistry, Washington and Lee University, 1886-94; Ph. D. (Hon.), University of North Carolina, 1889; Assistant Chemist, U. S. Department of Agriculture, 1894-6; Editor, University of Missouri Studies, 1904—, Professor of Chemistry, University of Missouri, 1896-1905, Professor of Chemistry and Director of the Laboratories, 1905—.

ISIDOR LOEB, B. S., LL. B., Ph. D.,

Professor of Political Science and Public Law.

B. S., University of Missouri, 1887, M. S., LL. B., 1893, Tutor in History, 1892-4; University Fellow in Jurisprudence, Columbia University, 1894-5; Assistant Professor of History, University of Missouri, 1895-9; Student, University of Berlin, 1899-1900; Professor of History, University of Missouri, 1899-1901; Ph. D., Columbia University, 1901; Professor of History and Administration, University of Missouri, 1901-2, Chairman, Graduate Conference of the Academic Department, 1904—, Professor of Political Science and Public Law, 1902—.

CURTIS FLETCHER MARBUT, B. S., A. M.,

Professor of Geology and Mineralogy, and Curator of the Geological Museum.

B. S., University of Missouri, 1889; A. M., Harvard University, 1894; Instructor in Geology and Mineralogy, University of Missouri, 1895-7, Assistant Professor of Geology and Mineralogy, 1897-9; Studied in Europe, 1899-1900; Professor of Geology and Mineralogy, University of Missouri, 1899—.

HOWARD BURTON SHAW, A. B., B. C. E., A. M.,

Professor of Electrical Engineering.

A. B., University of North Carolina, 1890, B. C. E., 1891, Instructor in Mathematics, Surveying, and Drawing, 1891-3; in Engineering Work with Phoenix Iron Company, 1892; A. M., Harvard University, 1894; Assistant in Electrical Engineering Laboratory, Lawrence Scientific School, Harvard University, 1894-6; in Engineering Work with Consolidated Traction Company, 1896; Assistant Professor of Electrical Engineering University of Missouri, 1896-9; Junior Dean of the School of Engineering, 1904-5; Professor of Electrical Engineering, 1899—.

GEORGE LEFEVRE, A. B., Ph. D.,

Professor of Zoology, and Curator of the Zoological Museum.

A. B., Johns Hopkins University, 1891, Fellow, 1894-5, Bruce Fellow, 1895-7, Ph. D., 1896, Assistant in Zoology and Embryology, 1897-8; Instructor in Zoology, Marine Biological Laboratory, Woods Hole, Mass., 1898-9; Professor of Zoology, University of Missouri, 1899—.

CHARLES A. ELLWOOD, Ph. B., Ph. D.,

Professor of Sociology.

Ph. B., Cornell University, 1896; Student, University of Chicago, 1896-7, University of Berlin, 1897-8; Fellow in Sociology, University of Chicago, 1898-9, Ph. D., 1899; General Secretary, Charity Organization Society, Lincoln, Nebraska, 1899-1900; Instructor in Sociology, University of Nebraska, 1899-1900; Professor of Sociology, University of Missouri, 1900—.

CHARLES WILSON GREENE, A. B., A. M., Ph. D.,

Professor of Physiology and Pharmacology.

A. B., Leland Stanford Jr., University, 1892, A. M., 1893; Ph. D., Johns Hopkins University, 1898; Instructor in Physiology, Leland Stanford Jr., University, 1893-8; Assistant Professor, 1898-1900; Instructor in Zoology, Marine Biological Laboratory, 1896 and 1897, in Physiology, 1900; Fellow in Physiology, Johns Hopkins University, 1897-8; Assistant, U. S. Bureau of Fisheries, 1901—; Professor of Physiology and Pharmacology, University of Missouri, 1900—.

MAX MEYER, Ph. D.,

Professor of Experimental Psychology.

Ph. D., University of Berlin, 1896; Research Work, Psychological Laboratory, 1896-8; Research Work, Clark University, 1899-1900; Professor of Experimental Psychology, University of Missouri, 1900—.

FREDERICK PUTNAM SPALDING, C. E.,

Professor of Civil Engineering.

C. E., Lehigh University, 1880; Member of Engineer Corps, Southern Pacific Railway, 1880-2; Assistant Engineer, Mississippi River Improvements, 1882-6 and 1888-90; Instructor in Civil Engineering, Lehigh University, 1886-8; Engineer in Charge of Street Extensions, Washington, D. C., 1890-1; Assistant Professor of Civil Engineering, Cornell University, 1891-8; Contracting Engineer, Bethlehem, Pa., 1898-1900; Professor of Civil Engineering, University of Missouri, 1900—.

FREDERICK HANLEY SEARES, B. S.,

Professor of Astronomy, and Director of the Laws Observatory.

B. S., University of California, 1895, Fellow in Astronomy, 1895-6, Instructor in Astronomy, 1896-8, Graduate Student, 1898-9; Student, University of Berlin, 1899-1900, University of Paris, 1900-1; Professor of Astronomy, University of Missouri, 1901—.

BENJAMIN MINGE DUGGAR, M. S., A. M., Ph. D.,

Professor of Botany.

B. S. Agricultural and Mechanical College, Mississippi, 1891; M. S., Alabama Polytechnic Institute, 1892; A. B., Harvard University, 1894 (University Scholar), A. M., 1895 (Townsend Scholar); Botanical Assistant, Illinois State Lab. Nat. Hist., 1895-6; Instructor in Botany, Cornell University, 1896-9, Ph. D., 1898; Student, Universities of

Leipzig and Halle, 1899-1900, Naples Biological Laboratory, 1900; Assistant Professor of Botany, Cornell University, 1900-1; Physiologist, Bureau Plant Industry, U. S. Department of Agriculture, 1901-2; Student, Universities of Munich, Montpelier and Bonn, 1905-6; Professor of Botany, University of Missouri, 1902—.

ARTHUR MAURICE GREENE, JR., B. S., M. E.,

Professor of Mechanical Engineering, and Junior Dean of the School of Engineering.

B. S., University of Pennsylvania, 1893, M. E., 1894; Instructor in Drawing, Graphics, and Kinematics, Drexel Institute, 1894-5; Instructor in Mechanical Engineering, University of Pennsylvania, 1895-1902; Mechanical Engineer, National Export Exposition, Philadelphia, 1899; in charge of Apprentices' School, Franklin Sugar Refinery, Philadelphia, 1893-5; in Engineers' Office, Union Traction Company, Philadelphia, Summers of 1893, 1897 and 1898; Professor of Mechanical Engineering, University of Missouri, 1902—, Junior Dean of the School of Engineering, 1906—7.

LUTHER MARION DEFOE, A. B.,

Professor of Mechanics.

Fellow in Mathematics, University of Missouri, 1891-2; A. B., Harvard University, 1893; Acting Professor of Mathematics, University of Missouri, 1893-4, Assistant Professor of Mathematics, 1894-7, Acting Professor of Mathematics, 1897-8, Assistant Professor of Mathematics, 1898-1902; Student, University of Cambridge (Eng.), 1902-3; Tutor to the University, University of Missouri, 1904—, Professor of Mechanics, 1902—.

CLARENCE MARTIN JACKSON, B. S., M. S., M. D.,

Professor of Anatomy and Histology, and Junior Dean of the Medical Department.

B. S., University of Missouri, 1898, M. S., 1899, M. D., 1900, Fellow in Biology, 1897-9; Graduate student, University of Chicago, 1900, 1901, University of Leipzig, 1903-4, University of Berlin, 1904; Instructor in Anatomy, University of Missouri, 1899-1900, Assistant Professor (in charge) of Anatomy and Histology, 1900-2, Professor of Anatomy and Histology, 1902—, Junior Dean of the Medical Department, 1906—.

ALBERT ROSS HILL, A. B., Ph. D., LL. D.,

Professor of Educational Psychology, and Dean of the Teachers College.

Munro Bursar, Dalhousie College, Halifax, N. S., 1888-1892, A. B., 1892; Scholar in Philosophy, Cornell University, 1892-3; Student in Heidelberg, Berlin, and Strassburg, Universities, one semester, each, 1893-4; Fellow in Philosophy, Cornell University, 1894-5; Ph. D., Cornell University, 1895; LL. D., South Carolina College, 1905; Professor of Psychology and Education, State Normal School, Oshkosh, Wisconsin, 1895-7; Professor of Philosophy, and Director of the Psychological Laboratories, University of Nebraska, 1897-1903; Professor of Educational Psychology, and Dean of the Teachers College, University of Missouri, 1903—.

EARLE RAYMOND HEDRICK, A. B., A. M., Ph. D.,

Professor of Mathematics.

A. B., University of Michigan, 1896; A. M., Harvard University, 1898; Student in Harvard University, 1897-1899 (in residence), and 1899-1901 (in absentia); Student at Goettingen, Germany, 1899-1901, Ph. D., 1901; Student at Ecole Normale Supérieure, Paris, second semester, 1901; Instructor in Mathematics, Sheffield Scientific School, 1901-1903; Professor of Mathematics, University of Missouri, 1903—.

MERRITT FINLEY MILLER, B. S., M. S. A.,

Professor of Agronomy, and Curator of Agricultural Museum.

B. S., Ohio State University, 1900; M. S. A., Cornell University, 1901; Assistant in Soil Survey, Bureau of Soils, U. S. Department of Agriculture, 1901-2; Instructor in Agronomy, Ohio State University, 1902-3, Assistant Professor of Agronomy, 1903-4; Professor of Agronomy, and Curator of Agricultural Museum, University of Missouri, 1904—.

FRANK PIERREPONT GRAVES, Ph. D., Litt. D., LL. D.,

Professor of the History and Principles of Education.

A. B., Columbia University, 1890, A. M. 1891; Ph. D., Boston University, 1892; Litt. D., Heidelberg University (Ohio), 1897; LL. D., Hanover College, 1897; Studied at Harvard University, 1894, University of Chicago, summer of 1901, 1902-4, in Europe part of 1904; Instructor in Greek, Drisler School, 1889; Assistant in Greek, Columbia University, 1890-1; Assistant Professor of Greek, Tufts College, 1891-3; Professor of Classical Philology, 1893-6; President of the University of Wyoming, 1896-8; President of the University of Washington, 1898-1903; Professor of the History and Principles of Education, University of Missouri, 1904—.

HERMANN BENJAMIN ALMSTEDT, B. L., Ph. D.,

Professor of Germanic Languages.

B. L., B. P., University of Missouri, 1895; Reader in German, University of Chicago, 1895-8, Assistant, 1898-1900, Ph. D. 1900, Associate, 1900-1, Dean in University College (College for Teachers), 1900-1; Studied in Germany, 1897, 1905-6; Assistant Professor of Germanic Languages, University of Missouri (in charge, 1902-3), 1901-5, Professor of Germanic Languages, 1905—.

OSCAR MILTON STEWART, Ph. B., Ph. D.,

Professor of Physics.

Ph. B., De Pauw University, 1892; Ph. D., Cornell University, 1897; Professor of Physics and Chemistry, Baker University, 1892-4; Fellow, Cornell University 1895-6, Assistant in Physics, 1896-8, Instructor in Physics, 1898-1901; Assistant Professor of Physics, University of Missouri, 1901-5, Professor of Physics, 1905—.

NORMAN MACLAREN TRENHOLME, A. B., A. M., Ph. D.,

Professor of History.

A. B., McGill University, 1895, Graduate Student, 1895-6; Graduate Scholar in History, Harvard University, 1896-8, A. M., 1897, Assistant in History, 1898-9, Ph. D.,

1899, Non-resident Graduate Student and Harris Fellow in History, studying in Europe, 1899-1900; Professor of History and English Literature, Western University (Can.), 1900-1; Instructor in History and Political Science, Pennsylvania State College, 1901-2; Assistant Professor (in charge) of History, University of Missouri, 1902-5, Professor of History, 1905—.

JUNIUS LATHROP MERIAM, A. B., A. M., Ph. D.,

Professor of Theory and Practice of Teaching.

A. B., Oberlin College, 1895; Student, New York State Normal College, 1897-8; Austin Scholar, Harvard University, 1901-2, A. M., 1902; Ph. D., Columbia University, 1905; Superintendent of Schools (Wakeman, Ohio), 1895-7; Principal of Elementary Schools (Akron, Ohio), 1898-9; Supervisor of Practice Teaching (New York State Normal College), 1899-1901; Assistant in Philosophy, Harvard University, 1902-3; Assistant in History of Education, Columbia University, 1903-4; Assistant Professor of Theory and Practice of Teaching, University of Missouri, 1904-5, Professor of Theory and Practice of Teaching, 1905—.

SIDNEY CALVERT, B. Sc., A. M.,

Professor of Organic Chemistry.

B. Sc., McGill University, 1890; Graduate Student, Harvard University, 1890-4, A. M., 1892, Assistant in Chemistry, 1892-4, Private Research Assistant, 1892-4; Assistant in Chemistry, Harvard Summer School, 1894; Student, University of Freiburg, 1901-2; Assistant Professor of Chemistry, University of Missouri, 1894-1905, Assistant Professor of Organic Chemistry, 1905-6, Professor of Organic Chemistry, 1906—.

HENRY MARVIN BELDEN, A. B., Ph. D.,

Professor of English Language and Literature.

A. B., Trinity College, 1888; Instructor in English, Lehigh University, 1890-1, University of Nebraska, 1893-4; Student, University of Strassburg, 1894-5; Ph. D., Johns Hopkins University, 1895; Assistant Professor of English Language and Literature, University of Missouri, 1895-1906, Professor of English Language and Literature, 1906—.

CLARENCE HENRY ECKLES, B. Agr., M. Sc.,

Professor of Dairy Husbandry.

B. Agr., Iowa Agricultural College, 1895, M. Sc., 1897; Student, University of Wisconsin, 1896; Instructor in Dairying, Iowa Agricultural College, and Dairy Bacteriologist to the Iowa Experiment Station, 1896-1901; Instructor in Dairy Husbandry, Massachusetts Agricultural College, Short Course of 1898-99; Student at the Universities of Goettingen and Bern, 1904-5; Assistant Professor (in charge) of Dairy Husbandry, University of Missouri, 1901-6, Professor of Dairy Husbandry, 1906—.

ROBERT MONTGOMERY BIRD, A. B., B. S., Ph. D.,

Acting Professor of Agricultural Chemistry.

A. B., B. S., Hampden-Sidney College, 1897; Professor of Mathematics and Natural Science, Frederick College (Md.), 1898-9; Lecture Assistant, Johns Hopkins Uni-

versity, 1900-1, Ph. D., 1901; Acting Professor of Chemistry, Mississippi Agricultural and Mechanical College, 1901-2; Acting Professor of Agricultural Chemistry and Chemist to the Experiment Station, University of Missouri, 1902-3, Instructor in Agricultural Chemistry, 1903-5, Assistant Professor of Agricultural Chemistry, 1905-6, Acting Professor of Agricultural Chemistry, 1906—.

JONAS VILES, A. B., A. M., Ph. D.,

Professor of American History.

A. B., Harvard University, 1896, A. M. 1897; Teacher in Dalzell's School for Boys, Worcester, 1896-8; Ph. D., Harvard University, 1901; Studied in London, 1901-2; Instructor in History, University of Missouri, 1902-5, Assistant Professor of History, 1905-7, Professor of American History, 1907—.

ASSISTANT PROFESSORS.

EVA JOHNSTON, A. M. Ph. D.,

Assistant Professor of Latin.

A. M., University of Missouri, 1895; Ph. D., University of Koenigsberg, 1905; Student, University of Missouri, 1902-6, Universities of Berlin and Heidelberg, 1899-1901, University of Koenigsberg, 1904-5; Assistant Professor of Latin, University of Missouri, 1899—.

WALTER SCOTT WILLIAMS, C. E.,

Assistant Professor of Topographic Engineering.

C. E., University of Missouri, 1885; Subdivision Engineer on Construction, Missouri Pacific Railway, 1886; Assistant Engineer on Location and Construction, K. C., F. S. & M. R. R., 1887-90; Chief Engineer on Location and Construction, Hearne & Brazos Valley R. R., 1891-2; Assistant Engineer with Mississippi River Commission, 1893-1901; Assistant Engineer in charge of Precise Levels, U. S. Lake Survey, 1901; Instructor in Civil Engineering, University of Missouri, 1901-3, Assistant Professor of Civil Engineering, 1903-4, Assistant Professor of Topographic Engineering, 1904—.

ABRAHAM LINCOLN HYDE, Ph. B.,

Assistant Professor of Bridge Engineering.

Ph. B., Yale University, 1886; Assistant Engineer, Berlin Iron Bridge Company, 1886-1891; Assistant Engineer, The King Bridge Company, 1891-92, Principal Assistant Engineer, 1892-94; Principal Assistant Engineer, Frank C. Osborn, 1894; Junior Partner, The Osborn Company, Civil Engineers, 1894-6; Consulting Engineer, Cleveland, Ohio, 1896-1901; Official Photographer, American Bridge Company, 1901; Instructor in Civil Engineering, Lehigh University, 1902-3; Assistant Professor of Civil Engineering, University of Missouri, 1903-4, Assistant Professor of Bridge Engineering, 1904—.

ERNEST BROWNING FORBES, B. S.,

Assistant Professor of Animal Husbandry.

B. S. (Zoology), University of Illinois, 1897; Zoological Assistant, Illinois Biological Station, 1894-6; Assistant to the State Entomologist of Minnesota, 1897-8; Zoological

Assistant, Illinois State Laboratory of Natural History, 1898; Acting State Entomologist of Minnesota, 1901; Assistant in Animal Husbandry, Illinois Experiment Station, 1901-2, B. S. (Agr.), University of Illinois, 1902, Instructor in Animal Husbandry, 1902-3; Assistant Professor of Animal Husbandry, University of Missouri, 1903—.

WINTERTON CONWAY CURTIS, A. B., A. M., Ph. D.,
Assistant Professor of Zoology.

A. B., Williams College, 1897, A. M., 1898, Assistant in Biology, 1897-8; Assistant in Biology, Johns Hopkins University, 1899-1900, Fellow, 1900-1, Ph. D., 1901; Instructor in Marine Biological Laboratory, Woods Hole, Mass., 1898-1903; Instructor in Zoology, University of Missouri, 1901-4, Assistant Professor of Zoology, 1904—.

WILLIAM BAIRD ELKIN, A. B., Ph. D.,
Acting Assistant Professor (in charge) of Philosophy.

A. B., Manitoba University, 1889; Fellow in Philosophy, Cornell University, 1890-1; Acting Professor of Philosophy, Indiana University, 1891-2; Student, Cornell University, 1892-4, Ph. D., 1894; Acting Professor of Philosophy, Colgate University, 1894-5; Student, in Europe, 1895-7; Lecturer on Theory and Practice of Teaching, Teachers College, Columbia University, 1897-9; Acting Professor of Psychology, Logic, and Pedagogics, Hamilton College, 1899-1901; Teacher of History and Civics, Kamehameha Schools, Honolulu, 1901-3; Acting Assistant Professor of Theory and Practice of Teaching, University of Missouri, 1903-4, Acting Assistant Professor of Philosophy, 1904-7.

WALTER LAFAYETTE HOWARD, B. Agr., B. S., M. S., Ph. D.,
Assistant Professor of Horticulture.

B. Agr., B. S., University of Missouri, 1901, M. S., 1903; Ph. D., University of Halle-Wittenberg, 1906, Assistant in Horticulture and Assistant Horticulturist to the Experiment Station, University of Missouri (in charge of Station work, 1901-2), 1901-3, Instructor in Horticulture, 1903-4, Assistant Professor of Horticulture, 1905—.

HERMAN SCHLUNDT, B. S., M. S., Ph. D.,
Assistant Professor of Physical Chemistry.

B. S., University of Wisconsin, 1892, Assistant in Chemistry, 1894-6, M. S., 1896; Instructor in Physics and Chemistry, West Division High School, Milwaukee, Wis., 1896-9; Student, University of Leipzig, 1899-1900; Fellow in Chemistry, University of Wisconsin, 1900-1, Ph. D., 1901, Instructor in Chemistry, 1901-2; Instructor in Chemistry, University of Missouri, 1902-5, Assistant Professor of Physical Chemistry, 1905—.

CAROLINE TAYLOR STEWART, A. B., A. M., Ph. D.,
Assistant Professor of Germanic Languages.

A. B., Kansas University; A. M., University of Michigan, 1895; Student, Bryn Mawr College, 1895-6, Fellow in Germanics, 1897; National Association Collegiate Alumnae Fellow, 1898; Woman's Educational Association Fellow, 1899; Ph. D., University of Berlin, 1901; Instructor in Germanic Languages, University of Missouri, 1902-5; Assistant Professor of Germanic Languages, 1905—.

JESSE HARLIAMAN COURSAULT, A. B., A. M., Ph., D.,

Assistant Professor of the Philosophy of Education.

A. B., Ohio State University, 1893, A. M., 1898; A. M., Harvard University, 1900; Scholar in Education, Columbia University, 1903-1904, Fellow in Education, 1904-1905, Ph. D., 1907; Teacher in Columbus, Ohio, High Schools, 1894-1899, and 1900-3; Assistant Professor of the Philosophy of Education, University of Missouri, 1905—.

OLIVER DIMON KELLOGG, B. A., M. A., Ph. D.,

Assistant Professor of Mathematics.

B. A., Princeton University, 1899, M. A., 1900; Ph. D., Goettingen, 1902; J. S. K. Fellow in Mathematics, Princeton University, 1899-1901; Student, University of Berlin, 1900-1, Goettingen, 1901-2; Instructor in Mathematics, Princeton University, 1903-5; Assistant Professor of Mathematics, University of Missouri, 1905—.

THOMAS JACOB RODHOUSE, B. S., M. C. E.,

Assistant Professor of Mechanical Drawing and Descriptive Geometry.

B. S. in Civil Engineering, University of Missouri, 1897; Fellow, Cornell University, 1904-5, M. C. E., 1905; Instructor in Mechanical Drawing and Descriptive Geometry, University of Missouri, 1897—1906, Assistant Professor of Mechanical Drawing and Descriptive Geometry, 1906—.

LEWIS DARWIN AMES, A. B., A. M., Ph. D.,

Assistant Professor of Mathematics.

B. L., University of Missouri, 1899; A. B., Harvard University, 1901, A. M., 1902, Ph. D., 1904; Graduate Scholar in Mathematics, Harvard University, 1902-3; Instructor in Mathematics, Chillicothe Normal School, 1890-1900; Instructor in Mathematics, Harvard University, 1901-2; Instructor in Mathematics, University of Missouri, 1903-6, Assistant Professor of Mathematics, 1906—.

ALAN ESTIS FLOWERS, M. E.,

Assistant Professor of Electrical Engineering.

University Scholar, Cornell University, 1898-1900, M. E., 1902; Construction Department, Westinghouse Electric and Manufacturing Company, 1902-3, Engineering Apprentice, 1904, Testing Department, Summer, 1905; Instructor in Electrical Engineering, University of Missouri, 1904-6, Assistant Professor of Electrical Engineering, 1906—.

ARTHUR HENRY ROLPH FAIRCHILD, A. B., A. M., Ph. D.,

Assistant Professor of English.

A. B., University of Toronto, 1900; Teaching Fellow, University of Wisconsin, 1900-1; Scholar, Yale University, 1901-3, A. M., 1903, Fellow, 1903-4, Ph. D., 1904; Instructor in English, University of Missouri, 1904-7, Assistant Professor of English, 1907—

MURRAY SHIPLEY WILDMAN, A. B., Ph. D.,

Assistant Professor (in charge) of Economics.

A. B., Earlham College, 1893; Teacher of History and Economics, Spiceland Academy and Normal School, 1893-95; Cashier of the Henry County Bank, Spiceland,

Indiana, 1895-97, Vice President, 1897-1901; Superintendent of Spiceland Academy and Normal School, 1898-1901; Graduate Student, University of Chicago, 1901-4, Fellow in Political Economy, 1902-4, Ph. D., 1904; Professor of History and Economics, Central College, 1904-5; Instructor in Economics, University of Missouri, 1905-6, Assistant Professor (in charge) of Economics, 1906—.

HENRY LAMAR CROSBY, B. A., A. M., Ph. D.,
Assistant Professor of Greek.

B. A., University of Texas, 1901, M. A. 1902, Fellow in Greek and Latin, 1901-2; A. M., Harvard University, 1903, Ph. D., 1905; Instructor in Greek, University of Pennsylvania, 1905-6; Assistant Professor of Greek, University of Missouri, 1906—.

WILLIAM NORTON DEY, B. A., M. A., Ph. D.,
Assistant Professor of Romance Languages.

B. A. and M. A., University of Virginia, 1902; Student at Paris, 1903; A. M., Harvard University, 1904, Austin Teaching Fellow in Romance Languages, 1905-6, Ph. D., 1906; Assistant Professor of Romance Languages, University of Missouri, 1906—.

WILLIAM ALVAN MILLER, B. S.,
Assistant Professor of Railway Engineering,

B. S. in C. E., University of Missouri, 1897; Rodman, U. S. Deep Waterway Survey, 1897-8, Chief of Party, 1898-9; Transitman on Engineer Corps, Baltimore and Ohio S. W. R. R., 1899-01; Resident Engineer, Choctaw, Oklahoma and Gulf R. R., 1901-02; Assistant on Engineer Corps, B. and O. S. W. R. R., 1902-03 Assistant Division Engineer, 1903-6; Assistant Professor of Railway Engineering, University of Missouri, 1906—.

ROSCOE HART SHAW, B. Sc.,
Assistant Professor of Dairy Husbandry.

B. Sc., New Hampshire College, 1897; Diploma Eidgenn. Polytechnikum, Zurich, Switzerland, 1899; Assistant Chemist, New Hampshire Experiment Station, 1899-1900; Acting Chemist, Wisconsin Experiment Station, 1900-01; Assistant in Chemistry, University of Wisconsin, 1901-2; Assistant Chemist, Kansas Experiment Station, 1902-Jan. 06; Assistant Professor of Agricultural Chemistry, University of Nebraska and Associate Chemist, Nebraska Experiment Station, Jan.—July, 1906; Dairy Expert, United States Department of Agriculture, 1906—; Assistant Professor of Dairy Husbandry, University of Missouri, 1906—.

ARTHUR LORD WESTCOTT, B. M. E., M. E.,
Assistant Professor of Experimental Engineering.

B. M. E., Purdue University, 1892, M. E. 1906, Assistant in Shop Work, 1892-3; Instructor in Mechanical Engineering, Michigan Agricultural College, 1893-9; Professor of Mechanical Engineering, University of Montana, 1899-1903; Mechanical Engineer with Browning Engineering Co., Cleveland, Ohio, 1903-5, with Brown Hoisting Machinery Co., 1905; Assistant Professor of Mechanical Engineering, Case School of Applied Science, 1905-6; Assistant Professor of Experimental Engineering, University of Missouri, 1906—.

INSTRUCTORS.

GRACE SARA WILLIAMS, A. B.,

Instructor in Romance Languages.

A. B., Knox College, 1897; Student, Columbia University, 1898-9, Paris, 1899-1900, Italy and Spain, 1900-1, Paris, 1905-6; Instructor in Romance Languages, University of Missouri, 1902—.

ELEXIOUS THOMPSON BELL, B. S., M. D.,

Instructor in Anatomy.

B. S., University of Missouri, 1901, M. D., 1903, Fellow in Anatomy, 1901-2, Assistant in Anatomy, 1902-3; student at University of Bonn, 1905-6; Instructor in Anatomy, University of Missouri (in charge, 1903-4), 1903—.

CHARLES ALBERT PROCTOR, A. B.,

Instructor in Physics.

A. B., Dartmouth College, 1900, Assistant in Physics, 1900-1; Non-resident Fellow of Dartmouth, studying at University of Chicago, 1901-2; Fellow and Assistant in Physics, University of Chicago, 1902-3; Instructor in Physics, University of Missouri 1903—.

HERBERT MEREDITH REESE, A. B., Ph. D.,

Instructor in Physics.

A. B., Johns Hopkins University, 1897, Fellow in Physics, 1899-1900, Ph. D., 1900; Fellow in Astronomy, Lick Observatory, University of California, 1900-1, Assistant, Lick Observatory, 1901-3; Assistant, Yerkes Observatory, University of Chicago, 1903-4; Instructor in Physics, University of Missouri, 1904—.

JOSEPH DOLIVER ELLIFF, A. B., A. M.,

Inspector of Accredited Schools, and Instructor in School Administration.

Graduate, Warrensburg State Normal School, 1893; Principal Central School, Carthage, Missouri, 1893-4; Principal Joplin, Missouri, High School, 1894-7; Superintendent Joplin Public Schools, 1897-1902; A. B., University of Missouri, 1903; Acting Superintendent of St. Joseph, Missouri, Public Schools, 1903-4; Student, University of Chicago, summer Quarters, 1905 and 1906; A. M., University of Missouri, 1907; Instructor in School Administration, and Inspector of Accredited Schools, University of Missouri, 1904—.

†ALBERT GRANBERRY REED, A. B., A. M.,

Instructor in English.

A. B., Vanderbilt University, 1895; Student, Yale University, 1896-7, A. M., 1897; Scholar in English, Columbia University, 1897-8; Student, Columbia University and University of Chicago, Summers of 1901-4; Fellow in English, University of Chicago, 1904-5; Professor of English and Philosophy, Baker University, 1898-9; Professor of English and History, Austin College, 1899-1900; Professor of English Language and

†Absent during session of 1906-7.

Literature, Hendrix College, 1900-1; Instructor in English, University of Texas, 1901-4; Instructor in English, University of Missouri, 1904—.

† CARL CONRAD ECKHARDT, Ph. B., M. A.,

Instructor in History.

Ph. B., Ohio State University, 1902; Assistant in History, University of Michigan, 1902-3, M. A., 1904; Student, Cornell University, Summer, 1905; Assistant in History, University of Missouri, 1903-5, Instructor in History, 1905—.

† LOUIS INGOLD, A. B., A. M.,

Instructor in Mathematics.

Student Assistant in Mathematics, University of Missouri, 1900-1, A. B., 1901, Teaching Fellow in Mathematics, 1901-2, A. M., 1902; Student, University of Chicago, 1902, 1905-7; Acting Assistant Professor of Mathematics, University of Missouri, 1902-3, Assistant in Mathematics, 1903-5, Instructor in Mathematics, 1905—.

ARTHUR ELLIOTT GRANTHAM, A. B., B. S.,

Instructor in Agronomy.

A. B., University of Indiana, 1903; B. S. in Agriculture, University of Missouri, 1905; Assistant Principal, Stockwell (Indiana) High School, 1900-1, 1902-3; Student (College of Agriculture) University of Illinois, 1904; Assistant in Agriculture, Missouri Agricultural Experiment Station, 1904-5; Instructor in Agronomy, University of Missouri, 1905—.

HOWARD VERNON CANTER, A. B., Ph. D.,

Instructor in Latin.

A. B., Washington and Lee University, 1896; Associate Principal and High School Instructor in Latin, French and German, Lexington, Virginia, Public Schools, 1895-98; Fellow, Johns Hopkins University, 1900, Ph. D., 1904, Fellow by Courtesy, 1904; Professor of Latin and Greek, Notre Dame of Maryland, 1902-4; Classical Master, University School, Baltimore, 1904-5; Instructor in Latin, University of Missouri, 1905—.

EDWIN ALLAN FESSENDEN, B. S., M. E.,

Instructor in Mechanical Engineering.

American Brake Company (Westinghouse), St. Louis, Summers 1901-2; Assistant Mechanical Engineer, National Candy Company, 1903; Washington University, 1903; B. S. in M. E., University of Missouri, 1904, M. E., 1906; Chief Draughtsman, Aetna Foundry and Machine Company, Springfield, Illinois, 1904-5; Instructor in Mechanical Engineering, University of Missouri, 1905—.

CAROLINE MCGILL, A. B., A. M.,

Instructor in Anatomy.

A. B., University of Missouri, 1904, A. M., 1905, Student Assistant in Zoology, 1902-4, Fellow in Zoology, 1904-5, Acting Instructor in Anatomy, 1905-6, Instructor in Anatomy, 1906—.

† Absent during session of 1906-7.

HOMER LEROY SHANTZ, B. Sc., Ph. D.,

Instructor in Botany.

B. Sc., Colorado College, 1901, Instructor in Biology (in charge, 1902-3), 1901-3; Instructor in Botany, School of Agriculture, University of Nebraska, 1903-5; Fellow in Botany, University of Nebraska, 1903-5, Ph. D., 1905; Acting Instructor in Botany, University of Missouri, 1905-6, Instructor in Botany, 1906—.

W. D. A. WESTFALL, A. B., Ph. D.,

Instructor in Mathematics.

A. B., Yale University, 1901; Ph. D., Goettingen, 1905; Douglass Fellow, Yale University, 1901-2; Instructor in Mathematics, Yale College, 1902-3; Student at Goettingen, 1903-5; Instructor in Mathematics, University of Missouri, 1905—.

CLARENCE CORY CRAWFORD, A. B., A. M., Ph. D.,

Instructor in History,

A. B., University of Kansas, 1903, A. M., 1904; Instructor in History and Civics, Lawrence High School (Kansas), 1903-4; Assistant in European History, University of Wisconsin, 1904-6, Ph. D., 1906; Instructor in History, University of Missouri, 1906—.

SAMUEL DAVID GROMER, S. B., Pe. B., A. M.,

Instructor in History and Economics,

S. B., Pe. B., University of Missouri, 1889; Superintendent of Schools, Ipswich, South Dak., 1889-91; State Institute Conductor, South Dak., 1890-91; Instructor in History, Political Science and Economics, Stanberry Normal, 1891-96, 1897-1904; Commissioner of Schools, Gentry Co., 1893-97; Graduate Student, University of Chicago, 1896; Student, Chautauqua College of Liberal Arts, 1897-98; A. M., Harvard University, 1905; Student at Columbia University, completing residence requirements for Ph. D., 1905-6; Instructor in History, College of the City of New York, 1906; Instructor in History and Economics, University of Missouri, 1906—.

JAMES WILLIAM PUTNAM, Ph. B., A. M.,

Instructor in Political Science and Economics,

Ph. B., Illinois College, 1894; Graduate Student, University of Chicago, 1895 and Summer Quarters 1900, 1901 and 1903; Instructor in History and Political Science, Illinois College, 1894-8, Assistant Professor (in charge) of History and Economics, 1898-1902; Fellow, Cornell University, 1902-1903, A. M., 1903; Assistant and Graduate Student, University of Wisconsin, 1903-4; Instructor in Economics and Administration, Northwestern University, 1904-6; Instructor in Political Science and Economics, University of Missouri, 1906—.

THOMAS JAMES RILEY, A. B., A. M., Ph. D.,

Instructor in Sociology,

A. B., Baker University, 1900, A. M., 1903; Ph. D., University of Chicago, 1904, Fellow, 1900-1, 1902-4; Professor and Acting Head of the Department of Mathematics, Baker University, 1901-2; Professor and Head of the Department of Mathematics, Western State Normal School, Kaiazoo, Mich., 1904-6; Director, St. Louis School of Philanthropy, 1906—; Instructor in Sociology, University of Missouri, 1906—.

GENERAL STATEMENT.

Organization:

Graduate instruction is offered in the Academic Department, Teachers College, School of Agriculture, and School of Engineering. The Graduate work of the Academic Department is under the direction and control of the Graduate Conference of that Department. The graduate work of the other departments is under the direction of the respective Faculties.

Admission:

Graduates of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities, and (in exceptional cases by special permission of the faculty) other persons of liberal education, are admitted to the Graduate Department. Admission to this Department, however, shall not be understood, as implying admission to candidacy for advanced degrees, which is subject to the regulations indicated below.

Persons desiring to pursue graduate work in the Academic Department are admitted by the Chairman of the Graduate Conference of that Department. In other departments graduate students are admitted by the respective Deans. These officials will furnish special information regarding the graduate work of their respective departments.

Fees and Expenses:

Graduate students are required to pay a library and incidental fee of \$5. Students who enter after the first of week of either semester must pay an additional fee of \$5 for late registration. There is no charge for tuition. Students taking laboratory work must make small laboratory deposits. The estimated cost of room rent and board for students living in Lathrop or Benton Hall, the dormitories for men, varies, according to the room, from \$2.30 to

\$2.80 a week. In Read Hall, the dormitory for women, it varies, according to the room, from \$4.50 to \$5.25 a week. The total necessary expenses of a student living in the dormitories for men need not exceed \$150 a year; for women living in Read Hall, they need not exceed \$225. The necessary expenses for students living in private families vary from \$3 to \$5 a week.

University Fellowships and Scholarships:

The University offers annually a number of University Fellowships yielding stipends of \$250, and University Scholarships with stipends of \$150. University Fellows and Scholars are exempt from payment of library and incidental fees and of all fees and deposits in the subject in which they hold fellowships and scholarships. These exemptions increase the value of the fellowships and scholarships by at least \$200 when comparison is made with those in institutions which require the payment of high tuition fees. These fellowships and scholarships will be awarded to the applicants who are best prepared and are of the highest promise in scholarship, irrespective of the lines of work they may desire to pursue. It is expected that fellows and scholars will be prepared for graduate work in the subject which they elect, and that they will devote themselves mainly to the work in this subject. They will do no teaching, but may be called upon to render a limited amount of service to the University in other ways. University fellows and scholars are allowed to engage in outside work only with the consent of the dean of the department and of the professor of the subject which they elect. The Executive Board upon the recommendation of such a dean and professor, may deprive any student of his fellowship or scholarship, whenever it may appear that he is not devoting himself as he should to his work as a fellow or scholar. Applications must be filed not later than April 1, in order to receive consideration in the award for the next Academic year. Applications received after this date and not later than June 1, will be considered in filling any vacancies which may occur in the fellowships or scholarships. Application blanks may be obtained from the Registrar of the University, and, when filled out, should be sent to the President of the University, Columbia, Mo.

Missouri College Union Scholarships:

The University offers annually a number of Academic graduate scholarships to the graduates of the colleges composing the Missouri College Union. The award of these scholarships is subject to the following regulations:

1. A graduate scholarship in the Academic Department is established for each of the colleges composing the Missouri College Union.

2. The faculty of each of said colleges shall be entitled to recommend for such scholarship, on or before March 15th of each year, the student graduating in that year or in either of the two years immediately preceding, who, in the judgment of the faculty, is best prepared to do graduate work.

3. The University will award a graduate scholarship for one year, with an annual stipend of \$125, to each of the students recommended in the manner indicated above.

4. The holders of these scholarships shall be entitled to all the privileges and exemptions and shall be subject to all of the regulations which are provided for holders of University Scholarships.

Curators' Scholarships:

By order of the Board of Curators, the student who attains the highest grade, or who shall be first in merit, in taking a Bachelor's degree, in the graduating class of any of the colleges or universities composing the Missouri College Union, will be admitted to any department of this University for the first year without the payment of any tuition, library, or incidental fee.

Literary and Scientific Societies:

A number of literary and scientific societies are maintained in the University.

The following, conducted by members of the faculties, are open to advanced students: "The Scientific Association," organized with a "General Section" and special Sections of "Biological Science," "Mathematical and Physical Science," and "Social and Political Science," "The Philological Club," "Mathematical Journal Club," and "Zoological Field Club."

The following are conducted by students, in some cases with the participation of members of the faculties: "Graduate Club," "Athenaeum," "Union Literary," "Bliss Lyceum," "Missouri State University Debating Club," "New Era Debating Club," "Medical Society," "Agricultural Society," "Engineering Society," "Der Deutsche Klub," "Sketch Club," "Asterisk Club," "English Club," "History Club," "Students' Meetings of the American Institute of Electrical Engineers."

Publications:

The "University of Missouri Studies," the "Bulletin of the Laws Observatory" and a series of special publications are maintained as a means of publishing the results of original research in the University by instructors and graduate students.

Location:

The University of Missouri is located near the center of the State in Columbia, a town of about 8,000 inhabitants, situated half way between St. Louis and Kansas City.

It is conveniently reached from the east, north and west by the Wabash Railroad and connecting lines. The Missouri, Kansas and Texas Railroad affords a direct route to Columbia to persons living on that line, and to those living on the Missouri Pacific, St. Louis and San Francisco, and Kansas City, Fort Scott and Memphis Railroads.

The surrounding country is elevated, well drained and diversified. It is a limestone region, remarkable for its healthfulness. The University campus includes 32 acres of undulating ground in the southern part of the town. The Experiment Farm lies one square south of the Campus, and comprises 648 acres. The Horticultural Grounds (a part of the Farm) are one square east of the Campus and include about 30 acres.

Buildings:

The University has the following buildings:

On the Campus—Academic Hall, separate buildings for Agriculture, Chemistry, Engineering, Geology and Zoology, Law, Mechanic Arts, and Medicine, the Parker Memorial Hospital, the Laws

Observatory, the power house, the President's house, and Benton Hall and Lathrop Hall—two dormitories for men; on the farm—the Agricultural Farm buildings and the Live Stock Judging and Dairy Buildings; on the Horticultural Grounds—the new Horticultural Building, Greenhouses, and Read Hall—the new dormitory for women. A new Gymnasium for men is located on the Rollins Athletic Field. The Gymnasium for women is located in Academic Hall.

Laboratories and Museums:

Laboratories. Facilities for practical instruction in the sciences are provided in the following laboratories: Agronomy, Animal Husbandry, Anatomy, Astronomy, Bacteriology, Botany, Chemistry (including Agricultural Chemistry and Experiment Station work), Dairy Husbandry, Engineering (Civil, Electrical, Sanitary and Mechanical), Entomology, Experimental Psychology, Geology and Mineralogy, Horticulture, Internal Medicine, Mathematics, Pathology, Pharmacology, Phonetics, Physics, Physiology, Physiological Chemistry, Surgery, Veterinary Science and Zoology.

Museums. There are also museums of Agriculture, Classical Archaeology, Ethnology, Geology and Zoology.

University Libraries:

The University libraries comprise the general library and many departmental libraries. They contain about 75,000 volumes. Students have access also to the library of the State Historical Society of some 23,000 volumes.

The University catalogue, which contains further information about the University and its several Departments, may be obtained from the University Publisher, Columbia, Missouri.

I. ACADEMIC DEPARTMENT.

Regulations Governing the Degree of Master of Arts:

The degree of Master of Arts is offered to students who have spent at least one year exclusively devoted to advanced courses of study, and who have submitted an acceptable dissertation and passed all prescribed examinations.

A student wishing to make application for the degree must fill out a blank form, provided for the purpose, and must present it to the Chairman of the Graduate Conference on or before October 1.

In order to be accepted by the Conference as a candidate for the degree, the student must give evidence that he has completed such a liberal undergraduate course of Academic study as is offered by colleges of good standing, and that he has received a baccalaureate degree in Arts or Science equivalent to the baccalaureate degree of the University of Missouri.

In making application the student must indicate the subject of the dissertation and the course of study selected by him on the form referred to above, which must bear the signature of approval of the professor in charge of his major subject, before it is presented to the Graduate Conference for its action. He may, however, defer submitting the subject of the dissertation to the Conference until November 1.

The candidate must choose a major subject, to which he must devote the greater part of his time during the year, and also such other subjects as may be approved. A majority of all work represented in the course of study must be selected from the groups designated as *Primarily for Graduates*.

A dissertation evincing capacity for original research and independent thought in the subject of the major work must be submitted to the Conference for approval on or before May 1. The student should consult the Chairman of the Graduate Conference for information regarding the form in which the dissertation must be presented.

The attention of students is called to the fact that graduate work can not be subjected to rigid regulation, and the Graduate Conference reserves the right to deal with each case on its individual merits.

With the approval of the professors concerned, such candidates as have fulfilled all requirements may, at the close of the year, be recommended by the Graduate Conference to the Board of Curators for the degree of Master of Arts.

Regulations Governing the Degree of Doctor of Philosophy:

1. *General Statement.*

The degree of Doctor of Philosophy is offered to students who have pursued advanced courses of academic study, without serious interruption, for a period of at least three years, and who have submitted an acceptable dissertation and passed all prescribed examinations.

In order to be accepted by the Graduate Conference as a candidate for the degree of Doctor of Philosophy, the student must give evidence that he has completed a liberal undergraduate course of academic study such as is offered by colleges of good standing, and that he has received a baccalaureate degree in Arts or Science equivalent to the baccalaureate degree of the University of Missouri.

The Conference reserves the right to decide in each case whether the antecedent training has been satisfactory, and, if any of the years of advanced work have been passed away from this University, whether they may be properly regarded as spent in university studies under suitable guidance and favorable conditions. Private study, or study pursued at a distance from libraries and laboratories, will not be considered as equivalent to university work. In any case the student must spend the year immediately preceding his final examinations in residence at the University of Missouri.

It should be emphasized that the requirements for this degree are not computed in terms of time and courses, but that the degree is conferred only upon such students as have reached, after long study, a high attainment in some special branch of learning and have given the clearest evidence of their ability to carry on independent, original research by reason of having made an actual contribution to knowledge of a character approved by competent judges.

2. *Acceptance of Candidates.*

A student wishing to make application for the degree of Doctor of Philosophy must fill out a blank form, provided for the purpose, secure thereto the signatures of the instructors with whom he desires to take his major and minor subjects and present it to the Graduate Conference for approval on or before October 1. He must also give satisfactory evidence of ability to translate French and German at sight.

3. *Requirements for the Degree:*

(a) *Subjects of Study*—Every candidate for the degree must select one principal or major subject, and at least one and not more than two subordinate or minor subjects, the combination to be approved by the Graduate Conference. The instructor with whom the student is taking his major subject acts as his official adviser and has the general direction of his work.

The student's principal work must be in the major subject. Although no regulations are laid down with respect to the time to be devoted to the major and minor subjects, in general it may be stated that the major subject should represent two-thirds of the student's entire time.

(b) *Dissertation*—The dissertation, embodying the results of original investigation, must be written upon a subject approved by the adviser, and must be submitted to the Conference, legibly written or typewritten, on or before May 1, when it becomes the property of the University. The student should consult the Chairman of the Conference for information regarding the form in which the dissertation must be presented.

Upon receiving the dissertation a committee is appointed whose duty it is to report upon it in writing to the Conference.

The candidate is required to print or publish the dissertation, with such revision as the Conference may allow, and he shall present one hundred and fifty copies of the work to the library of the University. The conference shall take any necessary action to insure the publication of the dissertation within one year after the conferring of the degree. A brief biographical sketch of the writer must be appended to the dissertation.

(c) *Examinations*—A committee, consisting of the professor of the candidate's major subject and the professors of his minor sub-

jects, is appointed to take charge of all examinations, and to report upon the same to the Conference in writing.

In addition to final written examinations the candidate may be required to take an oral examination in the presence of the Faculty.

The candidate may, with the approval of the professors in charge, take the examinations in his minor subjects upon the completion of his work in these subjects, but the final examination in the major subject cannot be taken until the dissertation has been approved and accepted.

(d) **Conferring of Degree**—Upon the satisfactory completion of all requirements, the candidate may be recommended by the Graduate Conference to the Board of Curators for the degree of Doctor of Philosophy.

COURSES OF INSTRUCTION.

(Courses designated by a number with the letter a attached, thus: 4a, 6a, are given the first semester only. Those designated by a number with the letter b attached, thus: 4b, 6b, are given the second semester only. Those designated merely by a number are continuous courses and are given both semesters. For courses primarily for undergraduates, see the University Catalogue.)

ANATOMY AND HISTOLOGY.

Professor JACKSON; DR. BELL; MISS MCGILL.

Primarily for Graduates.

10. **Investigation.** Problems of original research will be assigned in Anatomy or Histology. A reading knowledge of French and German is required. Hours to be arranged.

For Undergraduates and Graduates.

7b. **Topographic Anatomy.** A study of the topography of the various organs by means of serial sections through the body. Open only to students who have completed the undergraduate courses in Anatomy. Laboratory, M. W. F., 1:30-4:00.

8b. **Advanced Human Embryology.** Based upon a study of human and other mammalian embryos, especial attention being

paid to organogenesis and histogenesis. The elementary courses in Anatomy, Histology, and Embryology are necessary as preparation for this course. One lecture and two laboratory periods a week. Hours to be arranged.

9. **Advanced Anatomy.** Advanced work in Anatomy or Histology. Hours to be arranged. A seminary (which may be taken separately if desired), is held once a week.

ASTRONOMY.

Professor SEARES.

Primarily for Graduates.

8. **Theory of Orbits and Special Perturbations.**
9. **Celestial Mechanics.**
10. **Research.**

For Undergraduates and Graduates.

4. **History of Astronomy.** Historical development of the science; its spirit; its influence on other sciences. The development of astronomical theories as an exemplification of the methods of science in general. Open to students who have completed Course 1. M. W. F., at 2.

5. **Advanced Spherical and Practical Astronomy.** Open to students who have completed Course 2 or Course 3.

6a. **Numerical Computation.** Methods and precepts for the facilitation of numerical calculation. Development of the principal formulae of Interpolation and Mechanical Quadratures, with extensive applications to the problems of Astronomy and Geodesy. *Two hours credit.*

7b. **Method of Least Squares,** with applications to the problems of Astronomy and Geodesy. *Two hours credit.*

Hours to be arranged for Courses 5 to 10.

The Laws Observatory:

The practical work of the Department of Astronomy is carried on with the instruments of the Laws Observatory. The equipment consists of a 7 1-2 inch equatorial refracting telescope by Merz and Soehne, of Munich, a 2 1-10 inch transit instrument by Brunner, of Paris, a 2 1-8 inch altitude and azimuth instrument by E. & G. W.

Blunt, of New York, a Pickering stellar photometer, and a disc photometer by Brashear, a theodolite, sidereal and mean-time clocks, sidereal break-circuit chronometer, chronograph, sextants, micrometer, spectroscope, and outfit of smaller instruments.

The clocks and instruments are mounted on piers of solid masonry, isolated from the floors and walls of the building, and are provided with the usual electrical connections. The dome of the telescope is 18 feet in diameter. A cone 14 feet in diameter, revolving on balls, shelters the altitude and azimuth instrument.

In the year 1880, Dr. S. S. Laws, then President of the University, contributed largely from his private funds toward the improvement of the observatory building and the equipment. In recognition of this generosity the Board of Curators named the observatory in his honor.

The Laws Astronomical Medal:

The medal, called the "S. S. Laws Astronomical Medal," is offered annually at Commencement to the student who stands highest in Astronomy, and has at the same time attained a high average of general scholarship. An original thesis written on some astronomical subject and showing capacity for scientific investigation is required.

BOTANY.

Professor DUGGAR; DR. SHANTZ; MR. FLOYD.

Primarily for Graduates.

12. **Research.** Problems for investigation may be assigned in any of the general lines of work for which the student may be best prepared. A reading knowledge of French (or Latin) and German is essential. *Three or more times a week.* Hours to be arranged. Professor DUGGAR; DR. SHANTZ.

13. **Seminary.** The seminary offers to advanced students an opportunity to become familiar with current work in Botany. Reports on appropriate topics will be required, as well as reports on any research work in progress. *Once a week.* Professor DUGGAR.

For Undergraduates and Graduates.

6. **Mycology.** The morphology and physiology of representative groups of fungi, including the bacteria; special attention being

given also to culture methods, fungous diseases, and the culture and development of fleshy fungi. (This course will not be offered in 1907-08, alternating with 7b.) Lectures, M., at 10:30; laboratory, Th. S., at 10:30-12:30. Professor DUGGAR; Mr. FLOYD.

7b. **Parasitic Fungi.** Parasitism, the relations of host and parasite, fungous diseases. (Offered in 1907-08, alternating with 6.) Lecture, M., at 10:30; laboratory, Th. S., at 10-12:30. Professor DUGGAR; Mr. FLOYD.

8a. **Embryology and Cytology.** A comparative study of the embryology of representative green plants, cytology and micro-technique. Lecture, F. at 9; laboratory, W. F., at 1:30-4. (May not be offered in 1907-08).

9a. **Advanced Physiology.** Lectures and experimental work on absorption, nutrition and growth, and the effects of external stimuli upon plant functions and structures. Lecture, W., at 10:30; laboratory, T. Th., at 1:30-4. Professor DUGGAR.

10a. **The Principles of Evolution**, as applied to the study of plants. Lectures and seminary treatment. *Once a week.* Professor DUGGAR.

11. **Special Problems.** A preliminary to graduate research, and, in exceptional cases, special training in lines not sufficiently emphasized by general courses. Laboratory work and a bi-weekly conference for presentation of reports on work assigned. Adequate fundamental work is essential. *Three or more times a week.* Hours to be arranged. Professor DUGGAR; Dr. SHANTZ.

CHEMISTRY.

Professor BROWN; Professor CALVERT; Assistant Professor SCHLUNDT; Mr. MORLAN; Mr. LIEPSNER; Mr. READ.

Primarily for Graduates.

26. **Radio-activity.** Lectures, experimental work and recitations on the radio-active types of matter and atomic disintegration. (Based on Rutherford's "Radio-activity.") *Three times a week.* Assistant Professor SCHLUNDT.

29b. **Chemical Theory.** Lectures and recitations. *Three times a week.*

30a. **History of Chemistry.** Lectures and recitations. *Three times a week.*

Courses 29b and 30a should be preceded by courses 1 or 2, 11 and 18.

31a and 31b. **Advanced Organic Chemistry.** Lectures on selected topics, supplemented by reading and reports on classical researches. *Three times a week.* Professor CALVERT.

35. **Advanced Physical Chemistry.** Lectures on selected topics, supplemented by reading and reports on classical researches. A reading knowledge of French and German is required. Credit and hours to be arranged. Assistant Professor SCHLUNDT.

40. **Mathematical Chemistry.** Lectures on the application of the operations of the higher mathematics to the study of chemical reactions. *Twice a week.* Mr. MORLAN.

50. **Research.** This will consist principally of original work and investigations in (i) Inorganic, (ii) Organic, and (iii) Physical Chemistry, and will be adapted in some measure to individual cases.

A meeting is held weekly, at which reports on current literature, abstracts of special lines of research and the results and progress of investigations are presented for information and discussion. F., at 4.

For Undergraduates and Graduates.

11. **Organic Chemistry.** Lectures and recitations. M. W., at 4; laboratory (one). *Three hours.* Professor CALVERT.

11A. **Organic Chemistry.** Lectures and recitations (the same as 11); laboratory (two). *Four hours.* Professor CALVERT.

12. **Preparation of Organic Compounds and Organic Analysis.** *Three times a week.* This course may be taken with course 11 or 11A. Professor CALVERT.

13. **Industrial Organic Chemistry.** Starch, glucose, sugar, fats, oils, soaps, dyes, and other industries. Lectures and recitations. *Three times a week.* Professor CALVERT.

17. **Quantitative Organic Analysis.** The determination of the proximate constituents of natural (vegetable and animal) and artificial organic compounds. *Three times a week.* Professor CALVERT.

18. **Physical Chemistry.** Lectures, recitations and laboratory. This course should be preceded by courses in general inorganic and organic chemistry or accompanied by course 11, or 11A. A knowledge of elementary differential and integral calculus is de-

sirable. Lectures (two) at 8; laboratory (one). *Three hours.* Assistant Professor SCHLUNDT.

18A. **Physical Chemistry.** Lectures and recitations (the same as course 18); laboratory (two). *Four hours.* Assistant Professor SCHLUNDT.

19. **Physical Chemistry.** Laboratory work supplementary to course 18. *Three times a week.* Assistant Professor SCHLUNDT.

20. **Advanced Inorganic Chemistry.** Lectures and recitations. *Three times a week.*

21a and 21b. **Quantitative Chemical Analysis.** Laboratory *Three times a week.*

22. **Advanced Quantitative Chemical Analysis.** *Six times a week.*

23. **Electro-Chemistry.** Lectures, recitations and laboratory in electro-chemical measurements. Lectures (two); laboratory (one). *Three hours.* Assistant Professor SCHLUNDT.

24. **Electro-Chemistry.** Laboratory work supplementary to course 23. *Three times a week.* Assistant Professor SCHLUNDT.

CLASSICAL ARCHAEOLOGY AND THE HISTORY OF ART

Professor PICKARD.

Primarily for Graduates.

14. **Topography and Monuments of Athens.** Frazer's Pausanias will be taken as the basis of discussion. A reading knowledge of Greek, French and German required. T. Th., at 8.

15. **Archaeological Seminary.** Hours and work to be arranged.

For Undergraduates and Graduates.

5. **History of Modern Belgian and of Modern Dutch Painting.** Lectures and collateral reading. Critical study of representative pictures by means of lantern slides, photographs and other reproductions. T. Th., at 4.

6. **History of Greek Art.** A preliminary study of Assyrian and Egyptian Art, followed by a study of the development of Greek Architecture and Sculpture. Lectures, collateral readings, essays, with constant use of the lantern, photographic reproductions, and models and casts in the Museum of Classical Archaeology. Greek History (Greek 6a) is recommended to the students of this course. T. Th. S., at 2.

7a. Mycenaean Art or Art of Primitive Greece. The earliest discoveries at Mycenae, Tiryns and elsewhere will not be neglected but special attention will be given to the most recent publications on Troy, Crete, and the Argive Heraeum. M., at 8.

8b. Introductory Study of Greek Vases and Vase Paintings. Reference book, Pottier's Catalogue of the Louvre Vase Collections. M., at 8.

While a knowledge of the Greek Language is not an absolute prerequisite for 7a and 8b, these courses are intended for advanced students in Greek.

9. Etruscan and Graeco-Roman Art. This course should be preceded by course 6. It will deal with the earliest art of the Italian Peninsula, endeavor to show how this art reached its highest development among the Etruscans, how Etruscan influenced early Roman Art, how later Roman Art grew out of early Roman and late Greek Art modified by the circumstances and character of the Romans. Roman History (Latin 12b) is recommended to students in this course. M. W., at 9.

10. Roman Life. A systematic study of the topography of Rome and of extant remains particularly of Rome and Pompeii. Lectures and readings. Illustrated by the use of plans, maps, and lantern slides. As supplementary to this course, Roman Public and Private Life (Latin 5) is recommended. T. Th., at 11:30.

11. History of Renaissance Painting. First Semester: Italian Painting. Second Semester: Painting of the Netherlands and of Germany. This course should be preceded or accompanied by History 1. With Italian Painting, History 10b is also earnestly recommended. T. Th. S., at 8.

13. Masterpieces of Architecture, Sculpture, and Painting of Classical, Renaissance and Modern Times. Lectures fully illustrated with the stereopticon. This course aims to show the historical development of art by the discussion of some of the finest examples in each of the three divisions mentioned. M., at 2.

As supplementary to all courses offered in the history of Painting and of Sculpture the Theory of Representation (Free Hand Drawing) is recommended.

Museum of Classical Archaeology:

The museum occupies the third floor of the west wing of Academic Hall. It is supplied with models of temples representing

the three orders of Greek Architecture, and with plaster casts of representative specimens of Greek and Roman Sculpture. These are arranged chronologically, and on the walls are hung many framed photographs of other works of classic art. Several original specimens of Egyptian Sculpture have been recently added to the museum. The museum possesses a large number of unframed photographs and an extensive collection of lantern slides.

Renaissance and Modern Painting:

The collection of photographs, lantern slides, and other means of illustrating courses in these subjects have been very largely increased during the past year. For reproducing the color of the originals a *Kromskop* and lantern slides made by the *trichrome* process are used. The picture gallery near the Museum of Classical Archaeology is hung with carbon photographs, photogravures, and other reproductions of masterpieces of painting.

ECONOMICS.

Assistant Professor WILDMAN (*in charge*); Mr. PUTNAM; Mr. GROMER.

Primarily for Graduates.

4. **Economic Problems.** The problems that will be considered are chiefly those of capital and labor, as trade unions, arbitration and factory legislation. Liberal reference will be made to state and national reports. Given in 1907-8 and each alternate year. M. W. F., at 9.

7. **Advanced Economic Theory.** The first semester is occupied with a critical study of the various contributions which prominent writers, from the time of Adam Smith to the present, have made to a theory of Value. A similar study of the theories of Distribution will be carried on through the second semester. Not given in 1907-08.

8. **Seminary, Economic History of Missouri.** Open to graduates and to those who in the opinion of the instructor are fitted for the work. Hours to be arranged.

For Undergraduates and Graduates.

3a. **Science of Finance.** While this course is chiefly concerned with the principles of taxation, such problems as those of public

expenditure, budgetary practice and the proper relation of the State to industry and trade, are also involved. This course is open to those who have taken course 1 in Economics and should be followed by course 7b in Political Science, also, if possible by course 5b in this department. M. W. F., at 8.

5a. Money, Credit and Banking. This course is concerned with the origin and history of money and the scientific principles involved in monetary theory. The purpose will be to form correct notions regarding the nature and importance of a proper standard of value and system of currency. A study of the principles of credit and banking will be illustrated by comparison of the banking systems and methods of leading nations. T. Th. S., at 10:30.

5b. Financial History of the United States. This course presents a study of the financial operations of the Federal Government from the Organization of the Treasury Department to the present time. Various phases of our financial practice will be examined and criticised. The course is particularly adapted to the needs of students who have done the work of courses 3a and 5a. T. Th. S., at 10:30.

6a. Industrial History. It is the purpose in this course to give the student as clear a conception of the conditions of economic life and activity as the time allotted will permit. After a brief review of the Industrial Revolution in England in the 18th century the greater part of the course will be devoted to the industrial development of the United States. Hours to be arranged.

6b. Economics of Transportation. A history of the development of transportation agencies and a study of the principles of rate-making and rate-regulation. M. W. F., at 8.

9b. The Tariff. This course is open to students who have taken course 1 or 2a but students are advised to take course 2b also by way of further preparation. Hours to be arranged.

EDUCATION.

Professor HILL; Professor GRAVES; Assistant Professor COURSAULT.

Advanced courses of study in the History and Principles of Education and Educational Psychology are counted in fulfillment of the requirements for graduate degrees in the Academic Depart-

ment. For courses of study see statement of Teachers College, p. 61.

ENGLISH.

Professor ALLEN; Professor BELDEN; Assistant Professor FAIRCHILD; †Mr. REED.

Primarily for Graduates.

15. **Anglo-Saxon.** The study of Beowulf will be pursued as an exercise in Old English phonology, in text-criticism, and in the investigation of poetic principles. T. Th. S., at 3. Professor BELDEN.

20. **Literary Criticism.** Some standard works will first be read, to be followed by more distinctly constructive work in which an attempt will be made to determine the grounds of literary judgment, etc. A training in elementary psychology is desirable. *Three times a week.* Hours to be arranged. Assistant Professor FAIRCHILD.

21. **The Change of Literary Taste in the Seventeenth Century.** An attempt will be made to trace out in some detail the poetical canons of Jonson, Donne, Herbert and Vaughan, Herrick and the Caroline song-writers, Cowley and Waller. Special attention will be given to verse form. Monday evenings at 8. Professor BELDEN.

22. **Seminary.** Subject for 1907-8, Chaucer. Tuesdays from 4 to 6.

For Undergraduates and Graduates.

5. **English Literature of the Eighteenth Century.** First Semester: Dryden and Pope. Second Semester: Swift and the Essayists. M. W. F., at 9. Professor BELDEN.

7. **Shakespeare.** Eight to ten selected plays; class-room reading and interpretation. A thesis is required. M. W. F., at 3. Assistant Professor FAIRCHILD.

8. **Shakespeare.** The course will be devoted to the critical study of the formal elements of the plays (versification, language, etc.), considered in their organic character, and in their significance for Shakespeare's development. Hours to be arranged. Courses 7 and 8 may be combined to make four hours' credit. Assistant Professor FAIRCHILD.

† Absent during session 1906-7.

9. **Poetry of the Victorian Age.** Chief stress is laid on the poetry (narrative, lyric, and dramatic) of Tennyson, Browning, Matthew Arnold; but some attention is given to the other poets of the period. M. W. F., at 10:30. Mr. REED.

10. **American Literature.** (a) Sectional Development; (b) Growth of Nationality; (c) Present Tendencies. The leading writers in prose and verse will be considered first as to their intrinsic worth and secondly as illustrative of national development. T. Th. S., at 9. Professor BELDEN.

11a. **History of the English Language.** Lectures and textbook. T. Th. S., at 11:30. Professor ALLEN.

11b. **Study of Modern Prose Style, based upon masterpieces of representative authors.** Essays and reports. T. Th. S., at 11:30. Professor ALLEN.

12. **Anglo-Saxon.** Prose and poetry. M. W. F., at 11:30. Professor ALLEN.

13b. **Middle English.** W. F., at 8. Professor ALLEN.

14a. **The French Element in English.** Knowledge of French and Latin necessary. W. F., at 9. Professor ALLEN.

GEOLOGY AND MINERALOGY.

Professor MARBUT.

Primarily for Graduates.

Subject and hours to be arranged.

For Undergraduates and Graduates.

8. **Field Geology.** The detailed study, with the preparation of reports and maps, of geologically important districts. The selection of the area to be studied may be made by the student with the approval of the instructor.

9. **Geomorphology.** Special field and laboratory study of land form.

GERMANIC LANGUAGES.

Professor HOFFMAN; Professor ALMSTEDT; Assistant Professor STEWART.

Primarily for Graduates.

9. **Course in German Literature.** This course is intended to give the student a survey of the field of German literature from its beginning to the present time. Lectures are given in German.

Texts: Scherer, etc. T. Th. S., at 10:30. Assistant Professor STEWART.

* 10. **History of German Literature.** First Semester: The Reformation and Renaissance (1500-1750). Second Semester: From Klopstock through the period of Romanticism. This course is to give the student an insight into the development and decline of literary tendencies, forms, ideals and the influences that helped to develop them or to accelerate their decline. T. Th. S., at 10:30. Professor HOFFMAN.

11. **Historical German Grammar and Syntax.** This course is especially adapted to those who are fitting themselves to teach German. A knowledge of Gothic, Old High German, and Middle High German, though very desirable, is not required. Texts: Otto Behaghel, *Die Deutsche Sprache* (Leipzig-Prag, 1902), Streitberg, Kluge, Wunderlich. M. W. F., at 10:30. Assistant Professor STEWART.

*12. **Deutsches Seminar** (neuere Abteilung). Subject to be determined. *Twice a week.* Professor HOFFMAN.

*12b. **History of the Nibelungenlied.** This course is to comprise a study of the various theories as to the origin and authorship of the poem, the controversies in regard to it, and its relation to the Nibelungensaga and other sagas. A reading knowledge of Middle High German is required. M. W. F., at 3. Professor HOFFMAN.

13. **Middle High German.** Walther von der Vogelweide (first semester); Meier Helmbrecht (second semester). Discipline in phonology, morphology, syntax; comparison of mediaeval with modern idiom; a study in lyric and narrative poetry. M. W. F., at 11:30. Professor ALMSTEDT.

* 14. **The German Drama of the Nineteenth Century.** First Semester: Dramas of Kleist, Grillparzer, Hebbel and Ludwig will be studied. Second Semester: Anzengruber, Wildenbruch, Hauptmann, Sudermann, Fulda. *Three times a week.* Professor HOFFMAN.

15. **Old High German.** Old High German phonology and forms; critical reading of Old High German texts. Prerequisite,

*Probably only one of these courses (10, 12, 12b, 14) can be given in the coming session.

Course 17. Texts: Braune, Althochdeutsche Grammatik. Braune, Althochdeutsches Lesebuch, M. W. F., at 11:30. Professor ALMSTEDT.

16. **Deutsches Seminar (aeltere Abteilung).** Subject to be determined. For special students only. *Twice a week.* Professor ALMSTEDT.

17. **Gothic.** Phonology, morphology, and syntax; reading from Ulfilas; the relationship of Gothic to Indo-European and to later Germanic dialects, general introduction to the study of Germanic Philology. T. Th. S., at 11:30. Professor ALMSTEDT.

17b. **Old Saxon.** The reading of the Heliand with references to Holthausen, Altsaechsisches Elementarbuch. M. W. F., at 10:30. Professor ALMSTEDT.

18. **Old Norse.** Elementary course: Grammar and reading. Prerequisite, course 17. Professor ALMSTEDT.

For Undergraduates and Graduates.

4. **Schiller.** This course will consist in the study of Schiller's Jungfrau von Orleans, Maria Stuart, Braut von Messina, Wilhelm Tell, Wallenstein; essays in German, based on the texts; lectures on Schiller's life and works. Course conducted in German. M. W. F., at 10:30. Professor HOFFMAN.

5. **Goethe.** In the first semester a careful study will be made of Egmont, Goetz von Berlichingen, Hermann und Dorothea; the second semester will be given to the study of Iphigenie, Tasso, Faust. Essays written in German; lectures on other works of Goethe. The course is conducted in German, and requires, therefore, a knowledge of spoken German. T. Th. S., at 10:30. Professor ALMSTEDT.

*6a. **Outline Course in German Literature.** The aim of the course is to acquaint the student with the most important works and movements in the evolution of German literary life. T. Th. S., at 2. Professor HOFFMAN.

*7a. **Modern German Poetry.** This course is to comprise a careful study of representative poems with reference to their kind, merits, the time and circumstances under which they came into being, laying also stress on the study of metrics. Kluge, von Klenze. T. Th. S., at 2. Professor HOFFMAN.

*Probably only one of these courses (6a, 7a) can be given in the coming session.

7b. Deutsche Aufsätze und Stilübungen. Advanced course in German theme-writing; discussions of grammatical, syntactical, and stylistic points. This course is intended for teachers of German, or for students who propose to become teachers of German; conducted in German. T. Th. S., at 2. Professor HOFFMAN.

8. Practical Course in Current German Publications. *Once a week.* Assistant Professor STEWART.

GREEK.

Profesor MANLY; Assistant Professor CROSBY.

Primarily for Graduates.

14. Hesiod, Homeric Hymns, and Appollodorus. This course will deal with the Greek idea of the origin of the world, gods, and men, and the early conception of the universe together with the later developments of the myths. *Three times a week.* Hours to be arranged. Professor MANLY.

15. Homer. The whole of the Iliad and Odyssey will be read during the year with especial attention to the antiquities. A special subject will be assigned each student for investigation. Teubner text editions of the poems should be secured in advance. *Two or three times a week.* Hours to be arranged. Professor MANLY.

16a. Comparative Grammar. This course will be of interest to prospective teachers and all who are interested in the linguistic side of Greek and Latin. Lectures will be given on the principal facts of sounds and inflections; and the student will be expected from time to time to give careful study to early specimens of both languages. He should provide himself with Lindsay's Latin Inscriptions and Homer's Iliad. Other books needed for the course will be accessible in the college library. *Two or three times a week.* Hours to be arranged. Assistant Professor CROSBY.

17b. Plato. The Protagoras, Meno, Phaedo, and Phaedrus will be read, in part or entire. The course is intended primarily for those who have a ready reading knowledge of Greek of the classical period. Peculiarities of style and diction will be commented on as occasion demands, but more stress will be laid on content. Attention will be paid to the author's place in philosophy, and the student is referred for an account of his predecessors to Zeller's

Larger History of Greek Philosophy. *Two or three times a week.* Hours to be arranged. Assistant Professor CROSBY.

18. **Seminary.** This work will be conducted jointly by Professor Manly and Assistant Professor Crosby, and will be adapted to the needs of the graduate students in attendance.

For Undergraduates and Graduates.

12a. **The Greek Theater.** The origin and development of the Greek Theater will be considered, and disputed points in the structure of the theater, and in the presentation of plays will be discussed. The basis of the work will be Doerpfeld and Reisch's *Das Griechische Theater*. S., at 11:30. Professor MANLY.

13b. **Aristophanes.** Selected comedies will be read, and the origin and development of comedy will be considered. Attention will also be given to the life of the people as revealed in the plays. *Two or three times a week.* Hours to be arranged. Assistant Professor CROSBY.

HISTORY.

Professor TRENHOLME; Professor VILES; †Mr. ECKHARDT; Dr. CRAWFORD; Mr. GROMER; Mr. VAUGHN.

Primarily for Graduates.

24. **Seminary in Medieval History.** A research course on some special topic in the history of the middle ages to be selected as far as possible with reference to the wishes of the students and the resources of the library. Some little knowledge of Latin will be requisite, and ability to use French and German will be desirable. *May be elected for 2, 3, or 4 hours.* Professor TRENHOLME.

23. **Seminary in English Institutional and Legal History.** This course involves a detailed and careful study of the formation of the English Constitution and of the origin, growth, and development of legal and governmental institutions from the earliest times to the close of the Middle Ages. Special reports based on the sources and secondary authorities will be required from the members of the class from time to time. The General Library and the Law Library both contain valuable material for English Institutional History. *May be elected for 2, 3 or 4 hours.* Professor TRENHOLME.

†Absent during session of 1906-7.

22. **Seminary in American History.** A research course in selected topics in American Colonial History and the political and institutional development of the United States. In the assignment of topics an effort will be made to follow the individual preferences of students. *May be elected for 2, 3, or 4 hours.* Professor VILES.

21. **Seminary in Missouri History.** A course affording opportunity for investigation in Missouri History. Every student will be expected to investigate from the sources some topic in the narrative or political history of Missouri, to embody the results of his study in written form, and, at the option of the instructor, report to the class. In the assignment of topics preference will be given, as far as possible, to the interests and leanings of the individual student. *May be elected for 2, 3, or 4 hours.* Professor VILES.

20b. **Advanced United States History.** A study of selected topics in United States History. Lectures, discussion, and reports by the class. *Two or three times a week.* Hours to be arranged. Professor VILES.

19a. **American Colonial Institutions.** A course on the development of representative institutions, local government, the judiciary, etc., from their origins in English institutions of the sixteenth and seventeenth centuries to the Revolutionary war. The aim of the course is to trace the growth of the political institutions and ideals underlying the present government of the United States. Reports will be required from every student from time to time. This course should be preceded by the narrative course on the Colonial Period. *Twice a week.* Hours to be arranged. Professor VILES.

18b. **English Constitutional and Legal History Since the Norman Conquest.** A continuation of course 18a dealing with later institutions. M. W. F., at 2. Professor TRENHOLME.

18a. **English Constitutional and Legal History to the Norman Conquest.** A study of early English institutions from the sources and best secondary works. Lectures, reports, and discussions. M. W. F., at 2. Professor TRENHOLME.

16a. **Historical Method.** A course of training for advanced students of history in the nature of historical research, the methods to be used, auxiliaries to historical study, use of documents, etc. *Once or twice a week.* Professor TRENHOLME.

For Undergraduates and Graduates.

15a. Topics and Studies in Recent European History. A course having for its objects the investigation of special topics of importance in connection with recent European history. Topics will be selected with reference to the resources of the library and the course will be conducted by means of lectures, reports, discussions, and quizzes. Must be preceded by Course 4. M. W. F., at 2. Mr. ECKHARDT.

10a. The Middle Ages. This course will deal with medieval history and institutions from the time of the Roman Empire to the fourteenth century. T. Th. S., at 11:30. Dr. CRAWFORD.

11a. History of France to the Sixteenth Century. This course deals with French history from the Treaty of Verdun to the reign of Francis I. The leading events of the period and the chief features of constitutional development will be treated in detail, special emphasis being laid on the rise and development of the French Monarchy. Ability to read French will be desirable but not essential. T. Th. S., at 9. Mr. VAUGHN.

11b. History of France since the Sixteenth Century. This course will be a continuation of 11a, and will deal with the political and institutional history of France from about the year 1500. T. Th. S., at 9. Mr. VAUGHN.

14b. The Era of the Reformation. A study of the causes, events, and consequences of the religious revolutions of the sixteenth century with special attention to the influence of the German Reformation on politics and society. T. Th. S., at 11:30. Dr. CRAWFORD.

13b. The Age of the Renaissance. A course dealing with the rise of Italian Humanism and the spread of the Renaissance throughout Europe generally. Special attention will be given to the politics, literature, and art of the period. Students who elect this course are advised to take also Course 11, in the History of Art. Omitted 1906-7. T. Th. S., at 9. Professor TRENHOLME.

Courses 14b and 13b will usually be given in alternate years.

9a. History of England During the Tudor and Stuart Periods. A course on the political and constitutional history of England from 1485 to 1688. The English Reformation, the character and the machinery of the Tudor despotism, the Puritan movement, particu-

larly in its social and political aspects, the Restoration, and the revival of parliamentary government in 1688, will be the main topics of study. T. Th. S., at 9. Professor VILES,

10b. **Modern England.** The political and constitutional history of England since 1688. Especial attention will be given to the rise of parties, to the development of cabinet government, and to Parliamentary Reform in the nineteenth century. No text-book will be used but there will be assigned reading and weekly written tests, as well as oral quizzes and discussions. T. Th. S., at 9. Dr. CRAWFORD.

4. **Modern European History.** The political, social, and intellectual history of Continental Europe from 1648 to the present time with special attention to the French Monarchy under Louis XIV, the rise of Prussia and Russia, the struggle for colonial empire, the causes, events, and results of the French Revolution, the Napoleonic era, and the development of nationality and constitutional government in the nineteenth century. T. Th. S., at 9. Mr. ECKHARDT.

7b. **History of Missouri.** After a brief survey of French exploration and colonization in the Mississippi valley, of the Spanish regime, and the early settlements, the Louisiana Purchase and its causes will be taken up in more detail. The primary aim of the course, however, will be to give an account of the development of Missouri since 1803, of the progress of settlement, and of the political and narrative history. Every student will be expected to prepare several reports. This course must be preceded by a course in United States history. T. Th. S., at 9. Professor VILES.

8b. **History of Modern Colonization.** The purpose of this course will be to trace in outline the extension of the power of the nations of western Europe in other continents. The character and purposes of the colonial policies of these nations, and the narrative history of the more important colonies in America, Asia, and Africa, will be dealt with. Omitted 1906-7. M. W. F., at 2, Mr. ECKHARDT.

6. **History of the United States.** A course in the political and narrative history of the United States since 1763, taking up the development of parties and political ideals, foreign relations, territorial expansion, the slavery question, and the general development of the nation. M. W. F., at 10:30. Professor VILES.

5a. **American History to 1763.** A course in the political and social development of the American colonies to the expulsion of the French. M. W. F., at 2. Professor VILES.

LATIN.

Professor JONES; Assistant Professor JOHNSTON; Dr. CANTER.

Primarily for Graduates.

15. **Seminary.** Critical study of the Odes of Horace. Hours to be arranged. Professor JONES and Assistant Professor JOHNSTON.

16. **History of the Latin Language.** Sounds, inflections, syntax. M. W. F., at 10:30. Professor JONES.

18. **Sallust.** Sallust's Catiline, Jugurtha, and fragments from the history will be read, and a special subject assigned to each student for investigation. M. W. F., at 10:30. Assistant Professor JOHNSTON.

19. **A Critical Study of Lucretius.** Hours to be arranged. Not offered in 1907-1908. Dr. CANTER.

21. **Roman Epigram.** Hours to be arranged. Dr. CANTER.

For Undergraduates and Graduates.

6. **Catullus, Martial and the Elegiac Poets.** Must be preceded by courses 1, 3, and 5. T. Th. S., at 8. Dr. CANTER.

8a. **General Introduction to the Science of Language.** This course is intended for students of all departments who have linguistic interests. M. W. F., at 10:30. Not offered in 1907-1908.

8b. **Comparative Grammar of Greek and Latin.** This course presupposes an elementary knowledge of Greek and Latin. It is important for those who intend to teach the Classics in high schools. M. W. F., at 10:30. Professor JONES.

17. **Elementary Sanskrit.** A limited amount of classical text will be read and the grammar will be carefully examined for the purpose of shedding light on the related languages. An elementary knowledge of Greek and Latin is required. T. Th., at 10:30.

9. **Roman Drama (Plautus and Terence).** Must be preceded by courses 1, 3, and 5. T. Th. S., at 10:30. Assistant Professor JOHNSTON.

10. (a) **Tacitus, Annals;** (b) **Seneca.** Must be preceded by courses 1, 3 and 5. W. F., at 10:30. Dr. CANTER.

11. **Roman Literature. Characteristic selections.** Must be preceded by courses 1, 3 and 5. T. Th. S., at 11:30. Not offered in 1907-1908. Assistant Professor JOHNSTON.

20a. **Introduction to Latin Palaeography.** Includes the reading of facsimiles. *One hour a week.* Dr. CANTER.

20b. **Introduction to Latin Epigraphy.** Includes a study of representative inscriptions. *One hour a week.* Dr. CANTER.

23b. **The Elements of Oscan and Umbrian.** M. W. F., at 8. Not offered in 1907-1908.

MATHEMATICS.

Professor HEDRICK; Assistant Professor KELLOGG; Assistant Professor AMES; Dr. WESTFALL; †Mr. INGOLD.

(It is especially recommended that students intending to specialize in Mathematics should take courses in French and German in their preliminary work; but an extensive knowledge of the literature of those languages is not necessary.)

The courses past course 5 are open only to those who have secured the permission of the instructor in the course, and of the professor in charge. Courses 18-30 are offered for special work by rather advanced students and are given only when specially announced. Note the changes in numbers of courses.

Primarily for Graduates.

12a. **Infinite Series and Products.** Introduction to the Theory of Functions of a Real Variable. Lectures. Reference books: Osgood, Infinite Series and various general treatises. *Three hours.* Hours to be arranged. Alternate years. Not given, 1906-7. Assistant Professor AMES.

12b. **Galois' Theory of Substitutions.** Discontinuous Groups. Lectures, supplemented by reading. Text: Dickson, Theory of Algebraic Equations. *Three hours.* Hours to be arranged. Alternate years. Given 1906-7. Assistant Professor AMES.

13a. **Fourier's Series and Allied Series.** Introduction to mathematical physics. Lectures, supplemented by reading. *Three hours.* Hours to be arranged. Alternate years. Given 1906-7. Assistant Professor KELLOGG.

†Absent during session of 1906-7.

13b. Potential Function. This course forms a natural continuation of 13a. Lectures, supplemented by reading. *Three hours.* Hours to be arranged. Alternate years. Given 1906-7. Assistant Professor KELLOGG.

14. Theory of Functions of Real Variables. Higher Analysis, including the most important features of mathematical analysis, in a comprehensive but elementary manner. Lectures, supplemented by reading. References: Pierpont, Theory of Functions of Real Variables; Goursat; Whittaker; Vallee-Poussin; Serret-Bohlmann; Stolz, etc. *Three hours.* Hours to be arranged. Alternate years. Not given 1906-7. Professor HEDRICK.

15. Function Theory. First course. A general course, covering the theories of Riemann, Cauchy, and Weierstrass, in their elementary phases. Theory of Functions of a Complex Variable. Elliptic Functions. References: Burchardt; Durege; Klein; Picard; Borel, etc., and Ency. der Math. Wiss., II. *Three hours.* Hours to be arranged. Alternate years. Given 1906-7. Professor HEDRICK.

16. Theory of Differential Equations. To be preceded by course 7a. First semester, ordinary differential equations; second semester, partial differential equations; these may be elected or given separately. *Three hours.* Hours to be arranged. Alternate years. Given 1906-7. Dr. WESTFALL.

17a. Lie's Theory of Continuous Groups, with applications to Differential Equations and Contact Transformations. Lectures, based on Lie's Works. *Three hours.* Hours to be arranged. Alternate years. Not given, 1906-7. Assistant Professor AMES.

17b. Theory of Groups. General course. *Three hours.* Hours to be arranged. Alternate years. Not given, 1906-7. Assistant Professor AMES.

18a or b. Partial Differential Equations of Mathematical Physics. Naturally follows courses 13a and 13b. *Three hours.* Hours to be arranged. Assistant Professor KELLOGG.

The following courses are also offered occasionally when the needs of the students seem to warrant:

19. Theory of Numbers. The first semester will deal with the Classical Theory, the second with Algebraic Numbers; these may be elected or given separately. *Three hours.* Hours to be arranged. Assistant Professor KELLOGG.

20. **Analytical Mechanics.** This course is open only to students who have taken course 7a and b. *Three hours.* Hours to be arranged.

21a or b. **Integral Equations.** *Three hours.* Hours to be arranged. Dr. WESTFALL.

22a or b. **Theory of Groups.** Second course. *Three hours.* Hours to be arranged.

23. **Theory of Functions.** Second course, to be preceded by course 14. *Three hours.* Hours to be arranged. Professor HEDRICK.

24a or b. **Foundations of Geometry and Non-Euclidean Geometry.** *Three hours.* Hours to be arranged.

25a or b. **Calculus of Variations.** *Three hours.* Hours to be arranged.

26a or b. **Theory of Differential Equations.** Second course. *Three hours.* Hours to be arranged.

27a or b. **Theory of Sound (or Heat).** *Three hours.* Hours to be arranged. Assistant Professor KELLOGG.

28. **Differential Geometry.** Second Course on Theory of Surfaces. *Three hours.* Hours to be arranged.

29a or b. **Theory of Algebraic Invariants.** *Three hours.* Hours to be arranged. Assistant Professor AMES.

30. **Research Courses.** The professors and instructors will conduct research work in private with students who desire to do advanced work along special lines. These courses may only be undertaken with the very special advice of the professor in charge. Any number of hours sanctioned by the professor in charge may be entered, according to the nature and amount of work undertaken, and the course may be re-elected repeatedly for work in different years.

Mathematical Journal Club. The members of the department, and others who desire, will form a club for the examination of current literature and for the discussion of mathematical topics. Meetings will be held and reports made each week on a set day. Criticism and comment will then follow; and any subject of interest to the members of the Club will be discussed as occasion arises.

For Undergraduates and Graduates.

5. **Second Course in Calculus.** This course should be elected by all who have reasonably succeeded in course 3 or 4 (E), who desire to continue mathematical work through another year. It will deal with questions necessarily omitted or treated hurriedly in the first course on Calculus. Goursat-Hedrick Course in Mathematical Analysis will be used as a text, with explanatory lectures. *Three hours.* Hours to be arranged. Professor HEDRICK.

6a. **Theory of Equations and Determinants.** Recitations, supplemented by lectures; texts: Fine, College Algebra; Burnside and Panton, Theory of Equations. This course includes special work on advanced algebra. To be elected only with or after course 3 or 4, but independently of Course 6b. *Three hours.* Hours to be arranged. Assistant Professor KELLOGG.

6b. **Advanced Analytic Geometry.** Recitations, supplemented by lectures. The applications of the calculus and extensions of the elementary course on analytic geometry, including solid geometry. To be elected only with or after course 3 or 4, but independently of course 6a. *Three hours.* Hours to be arranged. Assistant Professor KELLOGG.

7a. **Elements of Differential Equations.** Recitations, supplemented by reading. Text: Murray, Differential Equations. Open to those who have taken course 3 or 4. *Three hours.* Hours to be arranged. Assistant Professor AMES.

7b. **Elements of Analytical Mechanics.** Open to those who have taken course 3 or 4. *Three hours.* Hours to be arranged. Assistant Professor AMES.

8a. **Elements of Differential Geometry.** Lectures. Introduction to the theory of modern differential geometry. Reference books: Joachimsthal; Niewenglowski; Bianchi; Darboux. Naturally follows either course 5 or 6b. *Three hours.* Hours to be arranged. Alternate years. Given, 1905-6.

8b. **Elements of Projective Geometry.** Lectures, supplemented by reading. Reference books: Emch, Projective Geometry; Reye, Geometrie der Lage; Scott, Modern Geometry. Election independent of course 8a. *Three hours.* Hours to be arranged. Alternate years. Given 1905-6.

9a or b. **Mathematical Laboratory.** A regular class will be conducted (if desired by a sufficient number) in the construction

of mathematical models, with explanatory lectures. *Three hours.* Hours to be arranged. (No credit can as yet be assigned for this work.) Professor HEDRICK and Mr. ———.

10a or b. **History of Mathematics.** *Three hours.* Hours to be arranged. This course will be given if desired by a sufficient number of persons qualified to enter it.

11a or b. **The Mathematical Theory of Probability, with Applications to Life Insurance and Statistics.** This course will now be given regularly if elected by three students. *Three hours.* To be arranged. ———.

For other courses on mathematical topics see also the announcements of the Teachers College, the School of Engineering, and the department of Physics.

PHILOSOPHY AND EXPERIMENTAL PSYCHOLOGY.

PHILOSOPHY.

Acting Assistant Professor ELKIN (*in charge*).

Primarily for Graduates.

8. **Seminary in Metaphysics.** This course is open only to students who have had the necessary preparation in Logic, Psychology, Ethics and the History of Philosophy, and possess a reading knowledge of German. *Two or three times a week.* Hours to be arranged.

For Undergraduates and Graduates.

4b. **History of Modern Philosophy.** A study of the development of speculative thought, and of the significance of philosophical ideas as a factor in human progress, from the beginning of the Christian era. The following movements will be treated: the transition from pagan philosophy to Christian; Patristic philosophy; Scholasticism; the Renaissance and Reformation; the rationalism of Descartes and Leibnitz; the pantheism of Spinoza; the empiricism of Locke and Hume; the critical philosophy of Kant; the idealism of Hegel; the common sense philosophy of the Scottish School; pessimism; positivism; and the philosophy of evolution. M. W. F., at 10:30.

5b. **Ethical Problems.** An examination of the basal concepts of ethics; the nature of ethics; the ground of right; theories of

conscience; duty and obligation; theories of the highest good; hedonism; utilitarianism; intuitionism; energism; egoism and altruism; optimism and pessimism; the problem of evil; the relation of morality to religion; character and freedom. T. Th. S., at 11:30.

6a, 7b. **The Problems of Philosophy.** A consideration of the fundamental problems of philosophy. The following subjects will be examined: the nature of philosophy; the relation of philosophy to science, and to religion; atomism and materialism; mechanism and teleology; parallelism and monism; evolution; pantheism; theism; empiricism; rationalism; skepticism; agnosticism; criticism; realism; idealism. M. W., at 11:30.

EXPERIMENTAL PSYCHOLOGY.

Professor MEYER; Mr. SISSON.

Primarily for Graduates.

8. **Psychological Seminary and Advanced Laboratory Work.** Critical reading of recent literature. Discussion of special problems and theories. Research work.

For Undergraduates and Graduates.

These courses are open only to students who have had an introductory course in General Psychology.

2b. **Experimental Didactics.** Application of the methods of the psychological laboratory to problems of instruction and training in schools and colleges. *Three times a week.*

3b. **Differential Psychology.** A study of individual differences in character and intelligence, their causes, and their practical significance in life, particularly in school, in civil service, and in legal practice. *Three times a week.*

4a. **General Esthetics.** An experimental as well as theoretical study of the psychological laws underlying our appreciation of the beautiful, chiefly in the arts of painting, sculpture, and architecture, and also in nature. No familiarity with the technic or history of art is required. The aim of this course is to develop in the student an independent judgment in questions concerning the beautiful. *Three times a week.*

4b. **Theory of Music.** The esthetic laws of music. The psychological differences between primitive and highly developed music, and between European and exotic music. *Three times a week.*

5a. **Advanced Psychology.** Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. *Three times a week.*

6b. **Comparative Psychology.** Mental development in the child and the race. Experimental methods of child study. Dawning intelligence during animal infancy. Experiments upon the mental processes of animals. Instinct and psychical heredity. Theories of mental evolution. *Twice a week.*

7b. **Abnormal Psychology.** The abnormalities of mental life resulting from inborn, pathological, or artificial causes (such as idiocy, aphasia, apraxia, somnambulism, hypnosis, etc.) and their educational, medical, and forensic significance. *Twice a week.*

Psychological Laboratory.

The psychological laboratory is well equipped with instruments. It consists of ten rooms, all connected by telephone wires, furnished with gas and electricity and four with water. The rooms are used for the purposes indicated. One office, one lecture room, one work shop, one room for the study of animals, one dark room for optical work; one room for work in odor and taste chiefly, three rooms for work on visual, auditory and other sensations and experiments in general, one dark room used for storage only.

PHYSICS.

Professor STEWART; Mr. PROCTOR; Dr. REESE.

Primarily for Graduates.

5. **Theory of Light.** *Three times a week.* M. W. F., at 11:30. Professor STEWART.

6. **Theory of Heat.** *Three times a week.* Mr. PROCTOR.

7. **Theory of Electricity and Magnetism.** *Three times a week.* T. Th. S., at 8. Professor STEWART.

10. **Seminary.** Critical reading and discussion of current research work in Physics. A colloquium in which all members of the teaching staff of the department and students of sufficient attainments take part. *Once a week.* T., at 4.

11. **Research Work.** Hours to be arranged. Professor STEWART.

15. **Theory of Vibrations.** *Twice a week.* Lectures. Dr. REESE.

For Undergraduates and Graduates.

8. **Electricity and Magnetism.** *Once, twice or three times a week.* This course is entirely laboratory work and must be preceded by either course 1 or 3. M. W. F., 1:30-4. Professor STEWART; Mr. PROCTOR.

4. **Electrical Measurements.** *Two or three times a week.* Lectures, M., at 9; laboratory, W. Th., 1:30-4. A knowledge of Calculus is required. Mr. PROCTOR.

12. **Heat and Light.** *Three times a week.* Open to those who have completed course 1 or its equivalent. T. Th. S., at 8. Dr. REESE.

Course 12 is intended for those who desire work of a more general and less mathematical character than courses 5, 6 and 7. This course is recommended to those preparing to teach in Secondary Schools.

9. **Advanced Work in General Physics.** This course, largely laboratory work, will be adapted to meet the needs and attainments of the individual student. The student may be assigned a definite problem, the literature of which must be studied and the experiment work performed with the care of original research. *Two to six times a week.* Professor STEWART and Mr. PROCTOR. M. W. F., 1:30-4.

PHYSIOLOGY.

Professor GREENE; Assistant Professor ———.

Primarily for Graduates.

6. **Advanced Physiology.** Advanced course in Physiology, Pharmacology, or Physiological Chemistry, open to students who have had sufficient preparation. Hours to be arranged. The work for the year 1907-08 will be mainly as follows: *First*, the chemistry of pathological processes. Assistant Professor ———. *Second*, the physiology of the circulatory system and its responses to the action of drugs. Professor GREENE.

7. **Physiological Seminary and Journal Club.** *Once a week.*

8. **Investigation.** Opportunity is here offered for research into questions of current interest in Physiology, Pharmacology, and

Physiological Chemistry. Problems will be assigned according to the individual needs of the students. Hours to be arranged. Professor GREENE; Assistant Professor ———.

For Undergraduates and Graduates.

4b. **Physiological Chemistry.** The chemistry of the tissues and the intermediary metabolism of the food stuffs. *Three times a week.* Hours to be arranged. Assistant Professor ———.

5b. **Pharmacology.** This course presents the physiological action of chemicals. The laboratory experiments are distributed to groups of students, and each group is required to demonstrate to other members of the course. Lecture, T. Th., at 8; laboratory, T. Th., from 1:30-4. *Four hours' credit.* Open to students who have had course 3a. Professor GREENE.

POLITICAL SCIENCE AND PUBLIC LAW.

Professor LOEB; Mr. PUTNAM.

Primarily for Graduates.

5. **Comparative Administrative Law.** A study of the nature and functions of the administration and the control over it in the United States, England, France, and Germany. Governmental structure will be studied in detail and local government will be considered with special reference to recent development. W. F., at 3.

6a. **Municipal Government.** A sketch of the history of municipalities followed by a study of the organization and functions of cities in Europe and in the United States. T. Th., at 11:30.

7b. **The Law of Taxation.** A study of the legal rules regulating taxation in the central and commonwealth governments of the United States. Should be preceded by Economics 3a. T. Th., at 11:30.

8a. **The Government of Missouri.** A study of the constitutional development of the state from the Louisiana Purchase to the present time, followed by a consideration of the organization and functions of the institutions of the central and local governments. T. Th., at 2.

10. **Seminary in Administration.** A course for the investigation of administrative organization and functions. In 1907-8 topics in Missouri administration will be studied from the sources. *May be elected for two, three or four hours.*

For Undergraduates and Graduates.

3b. **Elements of Jurisprudence.** An introduction to the study of law. This course treats of the nature, sources and classification of law, and includes a consideration of the fundamental concepts of private law. The nature and use of legal authorities will be discussed. T. Th., at 2.

4. **Comparative Constitutional Law.** A comparative study of the constitutional law of the principal states of Europe and America. Particular attention will be given to the field of individual liberty defined in the Constitution of the United States and interpreted in the decisions of the Supreme Court. *Three times a week.* T. Th., at 3. One additional hour to be arranged.

ROMANCE LANGUAGES.

Professor WEEKS; Assistant Professor DEY; Miss WILLIAMS.

FRENCH.

Primarily for Graduates.

11. **The Sixteenth Century.** Lectures, readings, and reports. The course includes the period between the close of the literature of the Middle Ages and the first years of the seventeenth century, with especial attention to the intellectual forces set in motion by the Renaissance and the Reformation in France. The first semester will be given to a general survey of the period in question. The second semester will deal chiefly with Montaigne and Rabelais, making a careful study of selected portions of their works, and of the influence and significance of their thought. T. Th. S., at 2. Miss WILLIAMS.

12. **Old French.** Paris and Langlois' Chrestomathie. A study in text criticism will be made of the manuscripts of *Guibert d'Andrenas*. The course is conducted in French. Although this course is intended for Graduates, Seniors who have taken with high credit the preceding work and who are making a specialty of Romance Languages, are occasionally allowed to elect it, since it can be pursued advantageously for two successive years. M. W. F., at 9. Professor WEEKS.

PROVENÇAL.

14b. **Provençal.** The books used will be Grandgent's *Old Provençal*, Heath & Co., 1905, and Crescini, *Manualetto Provenzale*, Padua, 1905. Restori's *Histoire de la littérature provençale* will also be useful to those taking the course. T. Th. S., at 2. Professor WEEKS.

For Undergraduates and Graduates.

8. **General View of French Literature.** A great deal of ground is covered in this course; much reading is done, very little translation. The first semester is devoted to the 17th and 18th centuries, the second to the 19th. One or more plays of each of the great classical dramatists are read, together with masterpieces in other branches of literature. T. Th. S., at 9. Professor WEEKS.

9. **French Literature in the Eighteenth and Nineteenth Century.** Lectures, readings and reports. The first semester is occupied with the study of Voltaire and his contemporaries chiefly the former—his life and character, his ideas and aims, and the nature and extent of his influence in France and abroad. The second semester treats of the Romantic and subsequent movements. M. W. F., at 10:30. Miss WILLIAMS.

10. **The Seventeenth Century.** An attempt is made in this course to obtain a general view of the classic period of French Literature. Especial attention is paid to the development of French prose. There is considerable outside reading, with written reports from time to time. Selections from nearly all the great writers of the seventeenth century will be read. T. Th. S., at 10:30. Assistant Professor DEY.

Courses 9 and 10 are given in alternate years.

ITALIAN.

For Undergraduates and Graduates.

16. **Advanced Course.** The Sixteenth Century and Dante. Open to Seniors and Graduates who have had at least two years of French, and who possess a fluent reading knowledge of modern Italian. The purpose of this course is to take as comprehensive a view as is practicable of the classical literature of Italy. The work studied will be mostly verse, but outside prose reading will be ex-

pected. During the first semester Machiavelli's *Il Principe*, Tasso's *Gerusalemme Liberata*, and portions of Ariosto's *Orlando Furioso* will be read. The second semester will be devoted mainly to the study of Dante and the *Divina Commedia*. T. Th. S., at 9. Miss WILLIAMS.

SPANISH.

For Undergraduates and Graduates.

18. **Spanish Literature of the Eighteenth and Nineteenth Centuries.** Lectures, composition, reading. Open to students who have taken course 17 or its equivalent. The object of this course is to acquaint the student with representative writers of the nineteenth century. A considerable amount of Spanish prose and verse will be read, and there will be composition based upon selected texts. T. Th. S., at 10:30. Assistant Professor DEY.

19. **The Golden Age of Spanish Literature.** Cervantes, Lope de Vega, Calderon. Open to students who have taken course 18 or its equivalent. Considerable attention will be given to Don Quixote and other works of Cervantes, and selected plays of Lope de Vega and Calderon will be read. M. W. F., at 10:30. Assistant Professor DEY.

PHONETICS.

Primarily for Graduates.

20a. **General Introduction to Philology.** An effort is made in this course to study the phenomena of speech sounds from a physiological standpoint. The University has established a laboratory of Experimental Phonetics for the more accurate study of the living speech. M. W. F., at 2. Professor WEEKS and Professor ALMSTEDT.

21. **Seminary.** An opportunity is here given for advanced work in special subjects. *Twice a week.*

SOCIOLOGY.

Professor ELLWOOD; Dr. RILEY.

Primarily for Graduates.

20a. **Advanced Sociology.** A critical study of sociological theory. Lectures, discussions, and theses by the class. T. Th. S., at 11:30. Professor ELLWOOD.

21b. **Psychological Sociology.** A critical study of the writings of Tarde, Le Bon, and Baldwin, with some attempt to make use of psychological principles in the interpretation of social phenomena. T. Th. S., at 11:30. Professor ELLWOOD.

25. **Anthropology and Ethnology.** A study of the evolution of man as an animal, and of the evolution and relations of the different races of mankind. T. Th., at 10:30. Professor ELLWOOD.

26. **Ethnic Psychology.** A study of the comparative psychology of races as shown in their customs, institutions, and social organization. Not given in 1907-08.

27a. **The Negro in America.** A study of the social, economic, moral, and educational conditions among the negroes of the United States. *Three times a week.* Hours to be arranged. Dr. RILEY.

30a or b. **History of Social Philosophy.** Lectures on the development of social thought from Aristotle to the present, especially since the time of Comte. Assigned reading. M. W. F., at 11:30. Professor ELLWOOD.

31a. **History of Philanthropy and the Poor Law.** *Twice a week.* Hours to be arranged. Dr. RILEY.

32b. **Socialism.** An historical and critical study of socialism since the French Revolution from the sociological standpoint. *Three times a week.* Hours to be arranged. Dr. RILEY.

35b. **Social Statistics.** A course in statistical method with practical work on selected problems. *Twice a week.* Hours to be arranged. Dr. RILEY.

40. **Seminary.** Research work along sociological and philanthropic lines. *Two, three, or four times a week.* Professor ELLWOOD and Dr. RILEY.

For Undergraduates and Graduates.

10a. **Modern Charity.** A study of the nature and origin of the dependent and defective classes, the principles and methods of relief, the management of institutions, etc. Reports by the class on special subjects for investigation. Additional work will be required of graduate students. M. W. F., at 10:30. Dr. RILEY.

11b. **Criminal Sociology.** A study of the causes, nature, and treatment of crime; the principles of criminal anthropology, criminal jurisprudence, and penology. Lectures and selected textbooks.

Additional work will be required of graduate students. M. W. F., at 10:30. Professor ELLWOOD.

12. **Preventive Philanthropy.** An intensive study of some specific problems in preventive work, such as sanitation and public health, the housing problem in cities, parks and playgrounds, the promotion of thrift, social settlements, the increased use of public school property, compulsory education, child labor legislation, the juvenile court, etc. T. Th., at 10:30. Dr. RILEY.

15a. **Rural Communities.** A study of the social conditions in American agricultural communities with a view to their improvement. T. Th., at 9. Dr. RILEY.

16b. **Urban Communities.** A study of the social conditions in American urban communities, with special reference to the satisfying of communal needs. T. Th., at 9. Dr. RILEY.

17a. **Social Condition of the Laboring Classes.** M. W., at 11:30. Dr. RILEY.

18b. **Social Aspects of Education.** A study of the bases and aims of education from the standpoint of sociology, and the demands of sociology upon subject matter and methods in education. M. W., at 11:30. Dr. RILEY.

ZOOLOGY.

Professor LEFEVRE; Assistant Professor CURTIS.

Primarily for Graduates.

11. **Research.** Special investigation of unsolved problems of Zoology in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is required. Hours to be arranged in accordance with the requirements of individual students.

12. **Seminary.** Meetings at which subjects of zoological investigation are reported and discussed by instructors and students. Each student is required to give at least six lectures during the year, and experience is thus gained in presenting, in the form of lectures, the results of reading and research. For the session of 1907-8 the following subjects will receive special attention in the work of the Seminary: heredity, sex determination, and the behavior of organisms. A reading knowledge of French and German is required. M., at 11:30.

For Undergraduates and Graduates.

7b. **Embryology of Invertebrates.** A study of the development of representative forms from the principal phyla of the invertebrates. Lecture, F., at 9; Laboratory, M. W., 9-11:30. Assistant Professor CURTIS.

8. **Cytology.** A study of the cell, with special reference to problems of development and inheritance. Cytological technique. Lectures and laboratory, T. Th. S., 10:30-12:30. Professor LEFEVRE.

9b. **Experimental Zoology.** An experimental study of growth, development, heredity, reactions to stimuli, and related subjects. The student is introduced to the methods and results of experimental research in zoological science. Lectures and laboratory. M. W. F., 8-10. Professor LEFEVRE.

10a. **Principles of Zoology.** A course of lectures treating of the main principles underlying zoological science. Emphasis is laid upon the problems of variation, heredity, evolution, adaption, and sex. Collateral reading in the writings of Darwin, Wallace, Romanes, Weismann, Brooks, Galton, Mendel, de Vries, Morgan, and others. W. F., at 11:30. Professor LEFEVRE.

For further information concerning the graduate work of the Academic Department address Professor Isidor Loeb, Chairman of the Graduate Conference, Columbia, Missouri.

II. TEACHERS COLLEGE.

The regulations concerning the degrees of Master of Arts and Doctor of Philosophy are essentially the same as those laid down by the Academic Department.

Before being admitted to candidacy for a Graduate Degree from the Teachers College, the student must give evidence of sound general knowledge of the history and theory of education, and must have had considerable experience in teaching.

All graduate students in the Teachers College, whether candidates for a degree or not, must make Education their major subject, but they may elect such related work as may be approved by the Head Professor of Education.

EDUCATION.

Professor HILL; Professor GRAVES; Professor MERIAM; Assistant Professor COURSAULT; Mr. ELLIFF.

Primarily for Graduates.

40. **Philosophy of Education.** The purpose of this course is to give insight into the significance of education as a conscious effort towards human evolution by a study of its relation to the life process, and thus, by giving clearer insight into the aims and methods of education, help to make educational practice a rationalized endeavor rather than a mere routine. This course is open only to students who have had training in philosophy. *Three times a week.* Assistant Professor COURSAULT.

41. **Seminary in Educational Psychology.** The special problems selected for study will depend upon the interests of those taking the course, the aim being to guide advanced students of Education in constructive work in the theory of education through a detailed study of a few aspects of mental development. The course is open only to students who have had considerable training in both Education and Psychology. *Twice a week.* Professor HILL.

42. **Seminary in the History of Education.** A critical investigation of topics in connection with the thesis work for the graduate degrees. *Twice a week.* Professor GRAVES.

43. **Seminary in School Administration.** A research course in school organization and administration with special reference to city school systems. The course is open only to teachers of considerable experience in school supervision who are otherwise qualified to undertake research work. *Twice a week.* Professor MERIAM and Mr. ELLIFF.

For Undergraduates and Graduates.

10a. **Educational Psychology.** This course aims to present the the main facts concerning the development of the human mind from childhood to adolescence, with special reference to the meaning of these facts for the teacher. It presupposes an elementary knowledge of General and Comparative Psychology. *Three times a week.* Professor HILL.

11b. **Principles of Education.** This course aims to develop the fundamental principles upon which educational procedure should rest, through a study of the psychological, sociological, and religious aspects of education. It presupposes a general knowledge of Psychology and of either Ethics or Sociology. *Three times a week.* Assistant Professor COURSAULT.

12a. **Educational Classics.** A critical study of a few of the great classics in Education. Presupposes a knowledge of History of Education and Educational Psychology. *Three times a week.* Assistant Professor COURSAULT.

13b. **History of Education in the United States.** Research work on the development of the organization and administration of the public school systems of this country. *Twice a week.* Professor GRAVES.

14a. **Secondary Education.** A study of the historical development of secondary education, especially in the United States, and a consideration of the leading problems now confronting secondary education in America. *Three times a week.* Assistant Professor COURSAULT.

15b. **School Systems.** A comparative study of the school systems of Germany, France, England, Canada, and the United States. *Three times a week.* Professor GRAVES.

16b. **School Supervision.** The leading topics in school administration are discussed, such as: construction, heating, ventilation,

lighting, sanitation, and equipment of school buildings; playgrounds; relations of superintendents to school boards, teachers, pupils, and citizens; grading, promotions, etc. *Three times a week.* Professor MERIAM and Mr. ELLIFF.

In addition to the above, a number of teachers' courses in Botany, English, German, etc., are open to seniors and graduates and may be counted as Education for the Bachelor's or Master's Degree.

For further information concerning the graduate work of the Teachers College, address Dean A. Ross Hill, Columbia, Missouri.

III. SCHOOL OF AGRICULTURE.

The College of Agriculture offers the Graduate Degrees of Master of Science in Agriculture and of Doctor of Philosophy.

Graduates of the College of Agriculture or of other colleges of equal standing, may be admitted to candidacy for Graduate Degrees.

Any graduate student in the College of Agriculture, before being admitted to candidacy for a Graduate Degree, must furnish to the Graduate Committee satisfactory evidence of fundamental knowledge of the principles of agriculture. This requirement will be adhered to, whether the student does his major and minor work in technical agricultural subjects or in other subjects offered in the College of Agriculture.

Candidates wishing to register in the College of Agriculture for a Graduate Degree should make their arrangements with the Graduate Committee which is charged with functions relative to the acceptance of candidates and arrangements for graduate work, in consultation with the head professors of those subjects in which the work is chosen.

Candidates for the degree of Master of Science in Agriculture are required to do one year's graduate work at the University. This work must consist of at least 12 hours a week throughout the year, the courses selected must be graduate in character, and must be approved by the Dean and the Graduate Committee. Not less than one-half of this work must be in a major subject and the remainder in one or two minor subjects.

An acceptable dissertation, embodying the results of research in the major subject, is also required. The completed dissertation must be typewritten and filed with the Graduate Committee at least three weeks before the candidate's graduation.

The conferring of the degree of Doctor of Philosophy is not dependent upon the fulfillment of a definite time requirement. Scholarly attainments are required in the case of candidates for this degree, particularly in power of independent investigation, which must be evinced by the production of a dissertation embodying the results of original research or productive scholarship of a higher order.

However, not less than three years of graduate study, in connection with proper library and laboratory facilities, are required. At least one year, immediately preceding the conferring of the degree, must be spent in resident work at the University of Missouri. The Graduate Committee shall determine, in the case of any candidate, what credit may be given for work done elsewhere. The candidate must give satisfactory evidence of his ability to read German and French.

The candidate is required to select a major subject for his principal work, and not less than one and not more than two minor subjects. No definite regulations are laid down as to the division of time between the major and minor subjects, but in general the candidate will be expected to devote two-thirds of his time to his major subject.

The head professors of the departments in which the candidate chooses his major and minor subjects shall take charge of his examinations and report the results to the Graduate Committee. An oral examination before the Agricultural Faculty may also be required. Upon the satisfactory completion of work for an advanced degree, the candidate may be recommended by the Agricultural Faculty to the Board of Curators for the degree.

COURSES OF INSTRUCTION.

AGRONOMY.

Professor MILLER.

Primarily for Graduates.

1. **Special Investigations.** Original investigations of soils and plants, their inter-relations and the influence of these phenomena upon plant production. The special work undertaken will be determined by the preparation and needs of the student.

For Undergraduates and Graduates.

2. **Seminary.** Reading and discussion of recent and special investigations in soil fertility and plant production. Original papers on assigned topics will be presented for discussion. Each student will be expected to contribute at least four such papers during the year. A reading knowledge of French and German is recommended.

ANIMAL HUSBANDRY.

Professor MUMFORD; Assistant Professor FORBES.

Primarily for Graduates.

1. **Animal Breeding.** Original research in connection with the methods and practices applicable to the improvement of domestic animals. Materials for the study of inbreeding, cross breeding, telegony, etc., and the relation of these phenomena to breeding practice is available in the breeding laboratory at the farm. Professor MUMFORD.

2. **Zoometry. Animal Measurement.** Statistical study of variation in animal form, function and performance. This course gives to the advanced student opportunity for intimate acquaintance with special subjects in animal breeding. Assistant Professor FORBES.

BOTANY.

Professor DUGGAR; Dr. SHANTZ.

Primarily for Graduates.

12. **Research.** Problems for investigation may be assigned in any of the general lines of applied botanical work for which the student may be best prepared. Professor DUGGAR.

13. **Seminary.** The seminary offers to advanced students an opportunity to become familiar with current work in botany. Reports on appropriate topics will be required. Professor DUGGAR.

For Undergraduates and Graduates.

9a. **Advanced Physiology.** Lectures and experimental work on absorption, nutrition and growth, and the effects of external stimuli upon plant functions and structures. Lectures, W., at 10:30; laboratory, T. Th., 1:30-4. Professor DUGGAR.

(All other courses in this subdivision are at present the same as in the Academic Department. See courses announced on page 29.)

DAIRY HUSBANDRY.

Professor ECKLES; Assistant Professor SHAW; Mr. WAYMAN;
Mr. THOMPSON.

Primarily for Graduates.

1. **Seminary.** The object of this course is to put the student in touch with the literature of the subject and with the investiga-

tions and advancement being made in different parts of the world. Each student presents papers on selected topics for discussion and makes reports on recent investigations and on current literature. *Once a week.*

2. Dairy Research. The work is arranged to suit the needs of the individual student. Opportunity and facilities will be given to study and investigate almost any dairy problem in which the student is interested. This work may be along the line of butter and cheese making; the bacteriology of milk and dairy products; or milk production including selection, feeding and management of dairy cattle.

For Undergraduates and Graduates.

3b. Milk Production. The breeds of dairy cattle; selection, breeding and development of a dairy herd; care and management of dairy cattle; feeding for milk production; production of certified and market milk; milk for butter making and cheese making; utilization of by-products of the dairy. T. Th. S., at 8.

ENTOMOLOGY.

Professor STEDMAN.

Primarily for Graduates.

4. Graduate Work in Entomology. Laboratory Work. Monographing a group (scientific) monographing a species (scientific and economic). Hours to be arranged. Must be preceded by course 3.

For Undergraduates and Graduates.

3. Advanced Entomology. Lectures and laboratory work. Internal anatomy, histology, physiology, embryology, breeding, life histories, habits, economy, distribution, dimorphism, mimicry, determination of species, classifications, ecology, methods, literature, distribution, legislation. Hours to be arranged.

HORTICULTURE.

Professor WHITTEN; Assistant Professor HOWARD.

Primarily for Graduates.

7. Special Investigation. This course is intended for graduates and advanced students. Special topics for investigation will

be assigned. Hours by appointment. Professor WHITTEN; Assistant Professor HOWARD.

For Undergraduates and Graduates.

4b. **Origin and Development of Varieties of Cultivated Plants.** Lectures and assigned readings. A discussion of the principles underlying the theory and practice of the modification and improvement of cultivated plants. T. Th. S., at 8. Professor WHITTEN.

VETERINARY MEDICINE.

Professor CONNAWAY; Assistant Professor TIFFANY.

Primarily for Graduates.

1. **Experimental Study of the Contagious and Infectious Diseases of farm animals**, such as tuberculosis, glanders, hog cholera, Texas fever, rabies, etc. The students will make inoculations, study and record clinical phenomena, make post mortems, preserve the diseased tissues and study them microscopically. A study of the literature of each disease is also required. Open to graduate veterinarians, who may be interested in inspection and quarantine work; also to Agricultural and Medical students who have completed the required work in Histology, Physiology, Bacteriology and Pathology offered in the Medical Department.

2. **Experimental Study of Veterinary Remedies.** This course is intended for Veterinary practitioners who desire to make a study of the physiological action of medicines on various farm animals, as well as a study of therapeutic action.

3. **Investigation.** Students who have suitable preparation will have an opportunity to assist in the Experiment Station work.

For further information concerning the graduate work of the School of Agriculture, address the Dean, H. J. Waters, Columbia, Missouri.

IV. SCHOOL OF ENGINEERING.

Admission:

The requirement for admission to candidacy for advanced degrees in Civil Engineering, Electrical Engineering, Mechanical Engineering and Chemical Engineering is the undergraduate degree of Bachelor of Science in Civil Engineering, Electrical Engineering, Mechanical Engineering or Chemical Engineering respectively, from this University, or an equivalent degree.

Degrees:

Candidates for the degrees of Civil Engineer (C. E.), Electrical Engineer (E. E.), Mechanical Engineer (M. E.), or Chemical Engineer (Ch. E.), must complete satisfactorily one year of graduate work in residence or two years of professional practice and graduate work *in absentia*, the equivalent of twenty-four hours of University credit and present an acceptable thesis.

The thesis subject shall be presented to the Dean of the School of Engineering on or before December 1, and the thesis itself on or before May 1 of the given year. The graduate work is under the direct charge of the heads of the respective departments.

Fellowships, Fees and Expenses:

For statement in regard to fellowships, see page 20.

For statement in regard to fees and expenses, see page 19.

Buildings:

There are two buildings devoted to instruction in Engineering: The Mechanic Arts Building containing the shops and drawing rooms, and the Engineering Building with lecture rooms, drawing rooms, and engineering laboratories, including apparatus rooms for surveying instruments, a laboratory for testing materials of engineering, a dynamo laboratory for electrical measurements, a laboratory for testing qualities of materials used in electrical construction, a steam laboratory, a hydraulic laboratory, and a laboratory for the testing of materials used in Mechanical Engineering.

These laboratories are fairly well equipped and apparatus is continually being added.

Libraries.

The School of Engineering has a carefully selected and arranged library. Students also have access to the general library (see page 23.)

COURSES OF INSTRUCTION.

CIVIL ENGINEERING.

Professor SPALDING; Assistant Professor WILLIAMS; Assistant Professor HYDE; Assistant Professor MILLER.

For Graduates.

31. **Railway Engineering.** Special advanced course in construction, maintenance and management. Hours to be arranged. Assistant Professor MILLER.

32. **Bridge Engineering.** Problems in theory and design of framed structures. Hours to be arranged. Assistant Professor HYDE.

33. **Sanitary Engineering.** Investigations and special problems in sanitary science. Hours to be arranged. Professor SPALDING.

34. **Hydraulic Engineering.** Problems in hydraulics, irrigation, river and harbor improvements. Hydraulic construction. Hours to be arranged. Professor SPALDING.

35. **Concrete Structures.** Theory of re-enforced concrete. Special laboratory investigations. Hours to be arranged. Professor SPALDING and Assistant Professor HYDE.

36. **Advanced Geodetic Surveying.** Problems relating to geodesy and precise surveying. Assistant Professor WILLIAMS.

ELECTRICAL ENGINEERING.

Professor SHAW; Assistant Professor FLOWERS.

For Graduates.

8. **Design.** Special problems; thorough study and design of a single piece of apparatus, such as an induction motor, direct cur-

rent generator, or rotary. Hours to be arranged. Assistant Professor FLOWERS.

9. **Telephony and Telegraphy.** Apparatus and systems. Lines: their properties, with special reference to effects of inductance and capacity. Wireless telegraphy. Hours to be arranged. Professor SHAW.

10. **Long Distance Transmission.** A thorough study of details. Hours to be arranged. Professor SHAW.

11. **Electric Railway Engineering.** Street, interurban and high speed electric railroading. Electric railway economics. Hours to be arranged. Assistant Professor FLOWERS.

12. **Storage Battery Engineering.** Hours to be arranged. Professor SHAW.

13. **Electrical Engineering Economics.** Hours to be arranged. Professor SHAW.

14. **Research.** Work and hours to be arranged to suit individuals. Professor SHAW and Assistant Professor FLOWERS.

MECHANICAL ENGINEERING.

Professor GREENE; Assistant Professor WESTCOTT; Mr. FESSENDEN.

For Graduates.

21. **Generation of Power.** Advanced work in the theory and design of steam, gas and oil engines, air compressors and motors, steam turbines and hydraulic motors. Hours to be arranged. Professor GREENE.

22. **Transmission of Power.** Study of the methods of the transmission of power, heating, lighting, and the arrangement of shops, plants, industrial institutions and towns. Transportation of materials. Hours to be arranged. Professor GREENE.

23. **Advanced Laboratory Work.** Determination of physical characteristics of oils, fuels, and metals. Thermodynamics of heat engines. Tests of complete plants. Original investigations. Hours to be arranged. Assistant Professor WESTCOTT.

24. **Railway Engineering.** Design, construction and operation of motive power, rolling stock and the auxiliary apparatus employed. Hours to be arranged. Professor GREENE.

25. **Kinematics and Machine Design.** Advanced work in kinematics and the design of apparatus for specific work. Hours to be arranged. Mr. FESSENDEN.

26. **Refrigeration.** Advanced work in the lay-out and operation of plants for refrigeration. Hours to be arranged. Professor GREENE.

27. **Engineering Office Work.** Keeping of costs, estimates, organization of shops, advertising. Hours to be arranged. Professors GREENE and Mr. FESSENDEN.

For further information concerning the graduate work of the School of Engineering, address, the Junior Dean of the School of Engineering.

UNIVERSITY OF MISSOURI

ANNOUNCEMENT

OF THE

GRADUATE DEPARTMENT

1909-1910



COLUMBIA, MISSOURI

THE UNIVERSITY OF MISSOURI.

The University of Missouri was located at Columbia, Missouri, in 1839, and courses of instruction in Academic work were begun in 1841. A Department of Education was established in 1867. This was changed to a Teachers College in 1904. The College of Agriculture and Mechanic Arts and the School of Mines and Metallurgy were made Departments of the University in 1870—the School of Mines and Metallurgy being located at Rolla. The Law Department was opened in 1872; the Medical Department in 1873; the School of Engineering in 1877. The latter was changed to the Department of Engineering in 1906. The Experiment Station was established, under act of Congress, in 1888. The Missouri State Military School was created a Department in 1890. In 1896 the Graduate Department was established.

Columbia, a town of about 10,000 inhabitants, is situated near the center of the State, half way between St. Louis and Kansas City. It is conveniently reached from the east, north, and west by the Wabash Railroad, and connecting lines. The Missouri, Kansas and Texas Railroad affords a direct route to Columbia to persons living on that line, and to those living on the Missouri Pacific, St. Louis and San Francisco, and other southern railroads.

The surrounding country is elevated, well drained and diversified. It is a limestone region, remarkable for its healthfulness. The University campus includes 32 acres of undulating ground in the southern part of the town. The Experiment Farm lies one square south of the Campus, and comprises 648 acres. The Horticultural Grounds (a part of the Farm) are one square east of the Campus and include about 30 acres.

The University has the following buildings at Columbia: Academic Hall; separate buildings for Agriculture, Chemistry, Engineering, Geology and Zoology, Law, Mechanic Arts, and Medicine, the Parker Memorial Hospital, the Laws Observatory, the Power House, the President's House, Benton Hall and Lathrop Hall, two dormitories for men; the Gymnasium for men; the Agricultural Farm Buildings, the Live Stock Judging and Dairy Buildings, the Horticultural building and green-houses, and Read Hall, the Dormitory for women. The Gymnasium for women is located in Academic Hall.

UNIVERSITY OF MISSOURI

ANNOUNCEMENT

OF THE

GRADUATE DEPARTMENT

1909-1910



COLUMBIA, MISSOURI

UNIVERSITY CALENDAR.

| | |
|--|-------------------------------|
| 1909—May 24-29 | Final Examinations |
| May 29, Saturday | Stephens Medal Contest |
| May 30, Sunday | Baccalaureate Sermon |
| May 31, Monday | Class Day |
| June 1, Tuesday | Alumni and Phi Beta Kappa Day |
| June 2, Wednesday | Commencement Day |
| June 3, Thursday | Summer Session Begins |
| August 3, Tuesday | Summer Session Closes |
| September 20-22 | Entrance Examinations |
| September 20, Monday | All Departments Open |
| November 24, Wednesday, 12 m., to November | |
| 29, Monday, 8 a. m. | Thanksgiving Holidays |
| December 22, Wednesday, at 4 p. m., to | } Christmas Holidays |
| 1910—January 4, Tuesday, at 8 a. m., | |
| January 31-February 5 | Mid-Year Examinations |
| February 7, Monday | Second Semester Begins |
| May 30-June 4 | Final Examinations |
| June 5, Sunday | Baccalaureate Sermon |
| June 6, Monday | Class Day |
| June 7, Tuesday | Alumni and Phi Beta Kappa Day |
| June 9, Thursday | Commencement Day |

THE GRADUATE DEPARTMENT.

OFFICERS OF INSTRUCTION AND ADMINISTRATION.

Names are printed in the several groups in the order of appointment.

PRESIDENT OF THE UNIVERSITY.

ALBERT ROSS HILL, A. B., Ph. D., LL. D.,

President, and Professor of Educational Psychology.

Munro Bursar, Dalhousie College, Halifax, N. S., 1888-1892, A. B., 1892; Scholar in Philosophy, Cornell University, 1892-3; Student in Heidelberg, Berlin, and Strassburg Universities, one semester, each, 1893-4; Fellow in Philosophy, Cornell University, 1894-5, Ph. D., 1895; LL. D., South Carolina College, 1905 and Dalhousie University, 1908; Professor of Psychology and Education, State Normal School, Oshkosh, Wisconsin, 1895-7; Professor of Philosophy, and Director of the Psychological Laboratories, University of Nebraska, 1897-1903; Professor of Educational Psychology, and Dean of the Teachers College, University of Missouri, 1903-1907; Professor of Philosophy of Education, Director of the School of Education, and Dean of the College of Arts and Sciences, Cornell University, 1907-1908; President, University of Missouri, 1908—.

PROFESSORS.

PAUL SCHWEITZER, Ph. D., LL. D.,

Professor of Agricultural Chemistry, and Chemist to the Experiment Station.

Student under Schneider, Sonnenschein, and H. Rose, at Berlin, 1858-60; Chemist to the Soda Ash Works, Schoeningen, 1860-2; Chemist to the Chemical Works at Detmold, 1862-3; Assistant Professor of Chemistry, Polytechnic Institute, Philadelphia, 1864-6; Assistant in School of Mines, Columbia College, 1866-72; Ph. D., University of Goettingen, 1869; LL. D., University of Missouri, 1897; Professor in the University of Missouri, 1872—.

EDWARD ARCHIBALD ALLEN, Litt. D.,

Professor of English Language and Literature.

Student, Randolph-Macon College, 1861-2; University of Virginia, 1866-8; Professor of Latin and Greek, Farmville College (Va.), 1873-81; Professor of English and Modern Languages, Central College, 1881-5; Litt. D., Washington and Lee University, 1890; Professor of English, University of Missouri, 1885—.

WILLIAM GWATHMEY MANLY, A. M.,

Professor of Greek Language and Literature.

Student, University of Virginia, 1882-4; Assistant Head Master, McCabe's University School, 1884-6; Professor of Greek, Mercer University, 1886-9; A. M., Harvard University, 1890; American School of Classical Studies at Athens, and traveling in Greece, 1900; Student, University of Berlin, 1904; Professor of Greek, University of Missouri, 1890—.

JOHN CARLETON JONES, A. B., A. M., Ph. D.,

Professor of Latin Language and Literature, and Dean of the College of Arts and Science.

A. B., Westminster College, 1879, A. M., 1882, Ph. D., 1891; LL.D., University of Missouri, 1908; Professor of Latin, Westminster College, 1880-2; Graduate Student, Johns Hopkins University, 1882-3; Assistant Professor of Latin and Greek, University of Missouri, 1883-7, Associate Professor of Latin, 1887-91; Student University of Leipzig and at Rome, 1895-6, University of Munich, 1903-4; Acting President, University of Missouri, 1905-6, Professor of Latin, 1891—, Dean of College of Arts and Science, 1900—.

JOHN WALDO CONNAWAY, D. V. S., M. D.,

Professor of Veterinary and Comparative Medicine, and Veterinarian to the Experiment Station.

D. V. S., Chicago Veterinary College, 1890; M. D., University of Missouri, 1891; Student, Johns Hopkins University, 1894-5, in Hygienic Institute Royal Veterinary College, Hanover and University of Berlin, 1904-5; Professor of Physiology, University of Missouri, 1891-7, Professor of Physiology, and Veterinarian to the Experiment Station, 1897-1900; Lecturer in the Graduate School of Agriculture, Session 1908 at Cornell University; Professor of Comparative Medicine, and Veterinarian to the Experiment Station University of Missouri, 1900—.

JOHN PICKARD, A. B., A. M., Ph. D.,

Professor of Classical Archaeology and History of Art, and Curator of the Museums of Art and Classical Archaeology.

A. B., Dartmouth College, 1883, A. M., 1886; Student, University of Leipzig, 1889, University of Berlin, 1890 and 1895, American School of Classical Studies in Athens, 1890-1, University of Munich, 1891-2; Ph. D., University of Munich, 1892; Student, American School of Classical Studies in Rome, 1901-2; Acting Dean of the Academic Faculty, University of Missouri, 1904-5, Professor of Classical Archaeology, 1892—.

JOHN CHARLES WHITTEN, B. S., M. S., Ph. D.,

Professor of Horticulture, and Horticulturist to the Experiment Station.

B. S., South Dakota Agricultural College, 1891, M. S., 1899, Instructor in Horticulture and Horticulturist (in charge) to the Experiment Station, 1892; Student, Cornell University, 1892; Assistant in Horticulture, Missouri Botanical Garden, 1893-4; Ph. D., University of Halle-Wittenberg, 1903; Professor of Horticulture, and Horticulturist to the Experiment Station, University of Missouri, 1894—.

HENRY JACKSON WATERS, B. S. A.,

Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station.

B. S. A., University of Missouri, 1886; Assistant Secretary, Missouri State Board of Agriculture, 1886-8; Assistant in Agriculture to the Missouri Experiment Station, 1888-91; Professor of Agriculture, Pennsylvania State College and Agriculturist to the Experiment Station, 1892-5; Director State Agricultural Exhibit, World's Fair, St. Louis, 1903-4; Student at the University of Leipzig, 1904-5; Dean of the College of Agriculture and Mechanic Arts, and Director of the Experiment Station, University of Missouri, 1895—.

BENJAMIN FRANKLIN HOFFMAN, B. L., M. L.,

Professor of Germanic Languages.

B. L., University of Missouri, 1884, M. L., 1888, Assistant Professor of Modern Languages, 1887-92; Student, Paris and Munich, 1892-3, University of Chicago, Summer Sessions, 1894, 1895, 1897, University of Leipzig, 1902-3, Summer Semester, 1906; Professor of Modern Languages, University of Louisiana, 1893-5; Professor of Germanic Languages, University of Missouri, 1895—.

FREDERICK BLACKMAR MUMFORD, B. S., M. S.,

Professor of Animal Husbandry, in charge of Animal Husbandry Department in Experiment Station.

B. S., Michigan Agricultural College, 1891, M. S., 1893; Assistant in Michigan Agricultural Experiment Station, 1891-3; Assistant Professor of Agriculture, Michigan Agricultural College, 1893-5; Student, University of Leipzig, 1900, Zurich, 1901; Professor of Agriculture, University of Missouri, 1895-1904, Acting Dean of the College of Agriculture and Mechanic Arts, and Acting Director of the Experiment Station, 1903-5, Professor of Animal Husbandry, 1904—, in charge of Animal Husbandry Department in Experiment Station, 1906—.

JOHN MOORE STEDMAN, B. Sc.,

Professor of Entomology, and Entomologist to the Experiment Station.

B. Sc., Cornell University, 1888, Instructor in Invertebrate Zoology, and Entomology, and Assistant Entomologist to the Experiment Station, 1888-90; Biologist to the United States Department of Agriculture, 1890-91; Professor of Biology, Trinity College, 1891-3; Professor of Biology, Alabama Polytechnic Institute, Agricultural and Mechanical College, and Biologist to the Experiment Station, 1893-5; Student, Universities of Berlin and Geneva and Naples Zoological Station, 1907-8; Professor of Entomology, and Entomologist to the Experiment Station, University of Missouri, 1895—.

WILLIAM GEORGE BROWN, B. S., Ph. D.,

Professor of Chemistry, and Director of the Laboratories.

Miller Scholar, University of Virginia, 1875. B. S., 1877; Professor of Chemistry, East Tennessee University, 1877-8; Professor of General and Agricultural Chemistry, University of Tennessee, 1878-80, Professor of Chemistry and Mineralogy, 1880-3; Student, University of Heidelberg, 1880-1; Instructor in Chemistry, University of Virginia, 1883-5; Morgan Fellow, Harvard University, 1884; Professor of Chemistry and Physics, South Carolina Military Academy, 1885-6; Professor of Chemistry, Washington and Lee University, 1886-94; Ph. D. (Hon.), University of North Carolina, 1889; Assistant Chemist, U. S. Department of Agriculture, 1894-6; Editor, University of Missouri Studies, 1904—; Professor of Chemistry, University of Missouri, 1896-1905, Professor of Chemistry and Director of the Laboratories, 1905—.

ISIDOR LOEB, B. S., LL. B., Ph. D.,

Professor of Political Science and Public Law, and Acting Dean of the Teachers College.

B. S., University of Missouri, 1887, M. S., LL. B., 1893, Tutor in History, 1893-4; University Fellow in Jurisprudence, Columbia University, 1894-5; Assistant Professor of History, University of Missouri, 1895-9; Student, University of Berlin, 1899-1900; Professor of History, University of Missouri, 1899-1901; Ph. D., Columbia University, 1901; Professor of History and Administration, University of Missouri, 1901-2, Chairman Graduate Conference of the College of Arts and Science, 1904—, Acting Dean of the Teachers College, 1908-9, Professor of Political Science and Public Law, 1902—.

CURTIS FLETCHER MARBUT, B. S., A. M.,

Professor of Geology and Mineralogy, and Curator of the Geological Museum.

B. S., University of Missouri, 1889; A. M., Harvard University, 1894; Instructor in Geology and Mineralogy, University of Missouri, 1895-7; Assistant Professor of Geology and Mineralogy, 1897-9; Studied in Europe, 1899-1900; Professor of Geology and Mineralogy, University of Missouri, 1899—.

HOWARD BURTON SHAW, A. B., B. C. E., A. M.,

Professor of Electrical Engineering, and Dean of the Department of Engineering.

A. B., University of North Carolina, 1890, B. C. E., 1891, Instructor in Mathematics, Surveying, and Drawing, 1891-3; in Engineering Work with Phoenix Iron Company, 1893; A. M., Harvard University, 1894; Assistant in Electrical Engineering Laboratory, Lawrence Scientific School, Harvard University, 1894-6; in Engineering Work with Consolidated Traction Company, 1896; Assistant Professor of Electrical Engineering, University of Missouri, 1896-9, Junior Dean of the School of Engineering, 1904-5, Professor of Electrical Engineering, 1899—, Dean of the Department of Engineering, 1907—.

GEORGE LEFEVRE, A. B., Ph. D.,

Professor of Zoology, and Curator of the Zoological Museum.

A. B., Johns Hopkins University, 1891, Fellow, 1894-5, Bruce Fellow, 1895-7, Ph. D., 1896, Assistant in Zoology and Embryology, 1897-8; Instructor in Zoology, Marine Biological Laboratory, Woods Hole, Mass., 1898-9; Member of Staff of Investigation, 1906; Temporary Assistant, U. S. Bureau of Fisheries 1907—; Professor of Zoology, University of Missouri, 1899—.

CHARLES A. ELLWOOD, Ph. B., Ph. D.,

Professor of Sociology.

Ph. B., Cornell University, 1896; Student, University of Chicago, 1896-7, University of Berlin, 1897-8; Fellow in Sociology, University of Chicago, 1898-9, Ph. D., 1899; General Secretary, Charity Organization Society, Lincoln, Nebraska, 1899-1900; Instructor in Sociology, University of Nebraska, 1899-1900; Professor of Sociology, University of Missouri, 1900—.

CHARLES WILSON GREENE, A. B., A. M., Ph. D.,

Professor of Physiology and Pharmacology.

A. B., Leland Stanford Jr., University, 1892, A. M., 1893; Ph. D., Johns Hopkins University, 1898; Instructor in Physiology, Leland Stanford Jr. University, 1893-8, Assistant Professor, 1898-1900; Instructor in Zoology, Marine Biological Laboratory, 1896 and 1897, in Physiology, 1900; Fellow in Physiology, Johns Hopkins University, 1897-8; Assistant, U. S. Bureau of Fisheries, 1901—; Professor of Physiology and Pharmacology, University of Missouri, 1900—.

MAX MEYER, Ph. D.,

Professor of Experimental Psychology.

Ph. D., University of Berlin, 1896; Research Work, Psychological Laboratory, 1896-8; Research Work, Clark University, 1899-1900; Professor of Experimental Psychology, University of Missouri, 1900—.

FREDERICK PUTNAM SPALDING, C. E.,

Professor of Civil Engineering.

C. E., Lehigh University, 1880; Member of Engineer Corps, Southern Pacific Railway, 1880-2; Assistant Engineer, Mississippi River Improvements, 1882-6 and 1888-90; Instructor in Civil Engineering, Lehigh University, 1886-8; Engineer in Charge of Street Extensions, Washington, D. C., 1890-1; Assistant Professor of Civil Engineering, Cornell University, 1891-8; Contracting Engineer, Bethlehem, Pa., 1898-1900; Professor of Civil Engineering, University of Missouri, 1900—.

FREDERICK HANLEY SEARES, B. S.,

Professor of Astronomy, and Director of the Laws Observatory.

B. S., University of California, 1895, Fellow in Astronomy, 1895-6, Instructor in Astronomy, 1896-8, Graduate Student, 1898-9; Student, University of Berlin, 1899-1900, University of Paris, 1900-1; Professor of Astronomy, University of Missouri, 1901—.

LUTHER MARION DEFOE, A. B.,

Professor of Mechanics.

Fellow in Mathematics, University of Missouri, 1891-2; A. B., Harvard University, 1893; Acting Professor of Mathematics, University of Missouri, 1893-4, Assistant Professor of Mathematics, 1894-7, Acting Professor of Mathematics, 1897-8, Assistant Professor of Mathematics, 1898-1902; Student, University of Cambridge (Eng.), 1902-3; Tutor to the University, University of Missouri, 1904—, Professor of Mechanics, 1902—.

CLARENCE MARTIN JACKSON, B. S., M. S., M. D.,

Professor of Anatomy and Histology, and Junior Dean of the Medical Department.

B. S., University of Missouri, 1898, M. S., 1899, M. D., 1900; Fellow in Biology, 1897-9; Graduate student, University of Chicago, 1900, 1901; University of Leipzig, 1900-4, University of Berlin, 1904; Instructor in Anatomy, University of Missouri, 1899-1900, Assistant Professor (in charge) of Anatomy and Histology, 1900-2, Professor of Anatomy and Histology, 1902—, Junior Dean of the Medical Department, 1906—.

EARLE RAYMOND HEDRICK, A. B., A. M., Ph. D.,

Professor of Mathematics.

A. B., University of Michigan, 1896; A. M., Harvard University, 1898; Fellow in Harvard University, 1898-1899 (in residence), and 1899-1901 (in absentia); Student at Goettingen, Germany, 1899-1901, Ph. D., 1901; Student at Ecole Normale Supérieure, Paris, second semester, 1901; Instructor in Mathematics, Sheffield Scientific School, 1901-1903; Professor of Mathematics, University of Missouri, 1903—.

MERRITT FINLEY MILLER, B. S., M. S. A.,

Professor of Agronomy.

B. S., Ohio State University, 1900; M. S. A., Cornell University, 1901; Assistant in Soil Survey, Bureau of Soils, U. S. Department of Agriculture, 1901-2; Instructor in Agronomy, Ohio State University, 1902-3, Assistant Professor of Agronomy, 1903-4; Professor of Agronomy, University of Missouri, 1904—.

HERMANN BENJAMIN ALMSTEDT, B. L., Ph. D.,

Professor of Germanic Languages.

B. L., B. P., University of Missouri, 1895; Reader in German, University of Chicago, 1895-8, Assistant, 1898-1900, Ph. D. 1900, Associate, 1900-1, Dean in University College (College for Teachers), 1900-1; Studied in Germany, 1897, 1905-6; Assistant Professor of Germanic Languages, University of Missouri (in charge, 1902-3), 1901-5, Professor of Germanic Languages, 1905—.

OSCAR MILTON STEWART, Ph. B., Ph. D.,

Professor of Physics.

Ph. B., De Pauw University, 1892; Ph. D., Cornell University, 1897; Professor of Physics and Chemistry, Baker University, 1892-4; Fellow, Cornell University 1895-6, Assistant in Physics, 1896-8, Instructor in Physics, 1898-1901; Assistant Professor of Physics, University of Missouri, 1901-5, Professor of Physics, 1905—.

NORMAN MACLAREN TRENHOLME, A. B., A. M., Ph. D.,

Professor of History.

A. B., McGill University, 1895, Graduate Student, 1895-6; Graduate Scholar in History, Harvard University 1896-8, A. M., 1897, Assistant in History, 1898-9, Ph. D., 1899, Non-resident Graduate Student and Harris Fellow in History, studying in Europe, 1899-1900; Professor of History and English Literature, Western University (Can.), 1900-1; Instructor in History and Political Science, Pennsylvania State College, 1901-2; Professor of Mediaeval History, Harvard University Summer School, 1907; Assistant, Professor (in charge) of History, University of Missouri, 1902-5, Professor of History 1905—.

JUNIUS LATHROP MERIAM, A. B., A. M., Ph. D.,

Professor of Theory and Practice of Teaching.

A. B., Oberlin College, 1895; Student, New York State Normal College, 1897-8; Austin Scholar, Harvard University, 1901-2, A. M., 1902; Ph. D., Columbia University, 1905; Superintendent of Schools (Wakeman, Ohio), 1895-7; Principal of Elementary Schools (Akron, Ohio), 1898-9; Supervisor of Practice Teaching (New York State Normal College), 1899-1901; Assistant in Philosophy, Harvard University, 1902-3; Assistant in History of Education, Columbia University, 1903-4; Assistant Professor of Theory and Practice of Teaching, University of Missouri, 1904-5, Acting Dean of the Teachers College, 1907-8, Professor of Theory and Practice of Teaching, 1905—.

SIDNEY CALVERT, B. Sc., A. M.,

Professor of Organic Chemistry.

B. Sc., McGill University, 1890; Graduate Student, Harvard University, 1890-4, A. M., 1892, Assistant in Chemistry, 1892-4, Private Research Assistant, 1892-4; Assistant in Chemistry, Harvard Summer School, 1894; Student, University of Freiburg, 1901-2; Assistant Professor of Chemistry, University of Missouri, 1894-1905, Assistant Professor of Organic Chemistry, 1905-6, Professor of Organic Chemistry, 1906—.

HENRY MARVIN BELDEN, A. B., Ph. D.,

Professor of English Language and Literature.

A. B., Trinity College, 1888; Instructor in English, Lehigh University, 1890-1, University of Nebraska, 1893-4; Student, University of Strassburg, 1894-5; Ph. D., Johns Hopkins University, 1895; Assistant Professor of English Language and Literature, University of Missouri, 1895-1906; Professor of English Language and Literature, 1906—.

CLARENCE HENRY ECKLES, B. Agr., M. Sc.,

Professor of Dairy Husbandry.

B. Agr., Iowa Agricultural College, 1895, M. Sc., 1897; Student, University of Wisconsin, 1896; Instructor in Dairying, Iowa Agricultural College, and Dairy Bacteriologist to the Iowa Experiment Station, 1896-1901; Instructor in Dairy Husbandry, Massachusetts Agricultural College, Short Course of 1898-99; Student at the Universities of Goettingen and Bern, 1904-5; Assistant Professor (in charge) of Dairy Husbandry, University of Missouri, 1901-6, Professor of Dairy Husbandry, 1906—.

†JONAS VILES, A. B., A. M., Ph. D.,

Professor of American History.

A. B., Harvard University, 1896, A. M. 1897; Teacher in Dalzell's School for Boys, Worcester, 1896-8; Ph. D., Harvard University, 1901; Studied in London, 1901-2; Professor of American History, Harvard University Summer School, 1907; Instructor in History, University of Missouri, 1902-5, Assistant Professor of History, 1905-7, Professor of American History, 1907—.

HERMAN SCHLUNDT, B. S., M. S., Ph. D.,

Professor of Physical Chemistry.

B. S., University of Wisconsin, 1894, Assistant in Chemistry, 1894-6, M. S., 1896; Instructor in Physics and Chemistry, West Division High School, Milwaukee, Wis., 1896-9; Student, University of Leipzig, 1899-1900; Fellow in Chemistry, University of Wisconsin, 1900-1, Ph. D., 1901, Instructor in Chemistry, 1901-2; Instructor in Chemistry, University of Missouri, 1902-5, Assistant Professor of Physical Chemistry, 1905-7, Professor of Physical Chemistry, 1907—.

WALTER LAFAYETTE HOWARD, B. Agr., B. S., M. S., Ph. D.,

Professor of Horticulture.

B. Agr., B. S., University of Missouri, 1901, M. S., 1903; Student, Universities of Leipzig and Halle, 1905-6; Ph. D., University of Halle-Wittenberg, 1906; Assistant in Horticulture and Assistant Horticulturist to the Experiment Station, University of Missouri (in charge of Station work, 1901-2), 1901-3, Instructor in Horticulture, 1903-4, Assistant Professor of Horticulture, 1905-8; Secretary, Missouri State Board of Horticulture, 1908; Professor of Horticulture, University of Missouri, 1908—.

PERRY FOX TROWBRIDGE, Ph. B., A. M., Ph. D.,

Professor of Agricultural Chemistry, and Chemist to the Experiment Station.

B. Pd., Michigan Normal College, 1892; Ph. B., University of Michigan, 1892, A. M., 1905; Ph. D., University of Illinois, 1906; Instructor in German and Sciences, Kalamazoo College, 1889-91; Instructor in Pedagogy, Michigan Normal College, 1892-3; Assistant in Chemistry, University of Michigan, 1893; Professor of Mathematics, Kalamazoo College, 1894; Assistant in Chemistry, University of Michigan, 1894-5; Student in Braunschweig Zucker Schule, Summer 1898, Marburg University, 1898-99; Instructor in Organic Chemistry, and Accountant in the Chemical Laboratory, University of Michigan, 1895-1902, Agricultural Superintendent and Beet Sugar Chemist, Michigan and California, 1902-04; Research Assistant in Nutrition, and Instructor in Chemistry, University of Illinois, 1905-07; Assistant Professor of Chemistry, University of Illinois, 1907 (resigned); Assistant Professor of Agricultural Chemistry and Associate Chemist (in charge) to the Experiment Station, University of Missouri, 1907-08, Professor of Agricultural Chemistry, and Chemist to the Experiment Station, 1908—.

†Absent during session of 1908-9.

WINTERTON CONWAY CURTIS, A. B., A. M., Ph. D.,

Professor of Zoology.

A. B., Williams College, 1897; A. M., 1898; Assistant in Biology, 1897-8; Assistant in Biology, Johns Hopkins University, 1899-1900; Fellow, 1900-1; Ph. D., 1901; Instructor in Marine Biological Laboratory, Woods Hole, Mass., 1898-1903; Instructor in Zoology University of Missouri, 1901-4; Temporary Assistant, United States Fisheries Bureau, 1907—; In charge of Invertebrate Zoology, Marine Biological Laboratory, 1908—; Assistant Professor of Zoology, University of Missouri, 1904-08; Professor of Zoology, 1908—.

HERBERT JOSEPH DAVENPORT, Ph. B., Ph. D.,

Professor of Economics.

Ph. B., University of South Dakota, 1894; Ph. D., University of Chicago, 1898; Student at the Harvard Law School, 1882-84; Ecole des Sciences Politiques, Paris, 1899; University of Leipzig, 1890; Instructing Fellow, University of Chicago, 1897-98; Principal of Lincoln High School, 1899-1902; Instructor in Economics, University of Chicago, 1902-04; Assistant Professor, 1904-06; Associate Professor, 1906-08; Professor of Economics, University of Missouri, 1908—.

CHARLES STUART GAGER, A. B., Pd. M., Ph. D.,

Professor of Botany.

A. B., Syracuse University, 1895; Pd. B., Pd. M., N. Y. State Normal College, 1897; Ph. D., Cornell University, 1902; V. Prin., Ives Seminary (Antwerp, N. Y.) 1895-6; Professor of Biological Science and Physiology, N. Y. State Normal College (Albany), 1897-1905; Assistant in Botany, Summer School, Cornell University, 1901, 1902, Instructor, 1905; Laboratory Assistant, N. Y. Botanical Garden, 1904-05; Acting Professor of Botany, Rutgers College, 1905; Professor of Botany, N. Y. University Summer School, 1905, 1906; Teacher of Biology, Morris High School, N. Y. City, 1905; Director of the Laboratories, N. Y. Botanical Garden, 1906-08; Professor of Botany, University of Missouri, 1908—.

ARTHUR ONCKEN LOVEJOY, A. B., A. M.,

Professor of Philosophy.

A. B., University of California, 1895; A. M., Harvard University, 1897; Student, Harvard University, 1895-8; James Walker Fellow of Harvard University, at the University of Paris, 1898-9; Assistant Professor of Philosophy, Leland Stanford Junior University, 1899-1900; Associate Professor, 1900-1; Professor of Philosophy, Washington University, 1901-8; Lecturer in Philosophy, Columbia University, 1907-8; Professor of Philosophy University of Missouri, 1908—.

HERBERT WADE HIBBARD, A. B., M. E., A. M.

Professor of Mechanical Engineering.

A. B., Brown University, 1886; Machinist and Erection Apprentice, Rhode Island Locomotive Works, 1886-89; M. E., Cornell University, 1891; in Engineering Works with Pennsylvania Railroad, 1891-94; Railway Investigations and report, four months in Europe, 1892; Chief Mechanical Engineer, Lehigh Valley Railroad, 1894-95; Assistant Professor of Machine Design and Locomotive Engineering, University of Minnesota, 1895-98; Tests of five classes of locomotives for Minneapolis, St. Paul & Saulte Ste. Marie Railway, 1896; Assistant Professor of Mechanical Engineering of Railways and Principal of Graduate School of Railway Mechanical Engineering, Cornell University, 1898-1900; A. M., Brown University, 1899; Inspection of Shops and Engineering Schools, Europe, summer, 1900; Professor of Mechanical Engineering of Railways and Principal of School, Cornell University, 1900-09; Expert Examiner in mechanical engineering, New York State Civil Service Commission, 1904, 1905, 1908; Engineering Work with New York Central Lines, summer, 1908; Professor of Mechanical Engineering, University of Missouri, February 1, 1909—.

ASSISTANT PROFESSORS.

EVA JOHNSTON, A. M., Ph. D.,

Assistant Professor of Latin.

A. M., University of Missouri, 1895; Ph. D., University of Königsberg, 1905; Student, University of Missouri, 1892-6; Universities of Berlin and Heidelberg, 1899-1901; University of Königsberg, 1904-5; Assistant Professor of Latin, University of Missouri, 1899—.

WALTER SCOTT WILLIAMS, C. E.,

Assistant Professor of Topographic Engineering.

C. E., University of Missouri, 1885; Subdivision Engineer on Construction, Missouri Pacific Railway, 1886; Assistant Engineer on Location and Construction, K. C., F. S. & M. R. R., 1887-90; Chief Engineer on Location and Construction, Hearne & Brazos Valley R. R., 1891-2; Assistant Engineer with Mississippi River Commission, 1893-1901; Assistant Engineer in charge of Precise Levels, U. S. Lake Survey, 1901; Instructor in Civil Engineering, University of Missouri, 1901-3, Assistant Professor of Civil Engineering, 1903-4, Assistant Professor of Topographic Engineering, 1904—.

ABRAHAM LINCOLN HYDE, Ph. B.,

Assistant Professor of Bridge Engineering.

Ph. B., Yale University, 1886; Assistant Engineer, Berlin Iron Bridge Company, 1886-1891; Assistant Engineer, The King Bridge Company, 1891-92, Principal Assistant Engineer, 1892-94; Principal Assistant Engineer, Frank C. Osborn, 1894; Junior Partner, The Osborn Company, Civil Engineers, 1894-6; Consulting Engineer, Cleveland, Ohio, 1896-1901; Official Photographer, American Bridge Company, 1901; Instructor in Civil Engineering, Lehigh University, 1902-3; Assistant Professor of Civil Engineering, University of Missouri, 1903-4, Assistant Professor of Bridge Engineering, 1904—.

CAROLINE TAYLOR STEWART, A. B., A. M., Ph. D.,

Assistant Professor of Germanic Languages.

A. B., Kansas University; A. M., University of Michigan, 1895; Student, Bryn Mawr College, 1895-6, Fellow in Germanics, 1897; National Association Collegiate Alumnae Fellow, 1898; Woman's Educational Association Fellow, 1899; Ph. D., University of Berlin, 1901; Instructor in Germanic Languages, University of Missouri, 1902-5, Assistant Professor of Germanic Languages, 1905—.

JESSE HARLIAMAN COURSAULT, A. B., A. M., Ph., D.,

Assistant Professor of the History and Philosophy of Education.

A. B., Ohio State University, 1893, A. M., 1898; A. M., Harvard University, 1900; Scholar in Education, Columbia University, 1903-4, Fellow in Education 1904-5, Ph. D., 1907; Teacher in Columbus (Ohio) High Schools, 1894-1899, and 1900-3; Assistant Professor of the Philosophy of Education, University of Missouri, 1905-7; Assistant Professor of the History and Philosophy of Education, 1907—.

OLIVER DIMON KELLOGG, B. A., M. A., Ph. D.,

Assistant Professor of Mathematics.

B. A., Princeton University, 1899, M. A., 1900; Ph. D., Goettingen, 1902; J. S. K. Fellow in Mathematics, Princeton University, 1899-1901; Student, University of Berlin, 1900-1, Goettingen, 1901-2; Instructor in Mathematics, Princeton University, 1903-5; Assistant Professor of Mathematics, University of Missouri, 1905—.

THOMAS JACOB RODHOUSE, B. S., M. C. E.,

Assistant Professor of Hydraulic Engineering.

B. S. in Civil Engineering, University of Missouri, 1897; Fellow, Cornell University, 1904-5, M. C. E., 1905; Instructor in Mechanical Drawing and Descriptive Geometry, University of Missouri, 1897-1906, Assistant Professor of Mechanical Drawing and Descriptive Geometry, 1906-7, Assistant Professor of Hydraulic Engineering, 1907—.

LEWIS DARWIN AMES, A. B., A. M., Ph. D.,

Assistant Professor of Mathematics.

B. L., University of Missouri, 1899; A. B., Harvard University, 1901, A. M., 1902, Ph. D., 1904; Graduate scholar in Mathematics, Harvard University, 1902-3; Instructor in Mathematics, Chillicothe Normal School, 1890-1900; Instructor in Mathematics, Harvard University, 1901-2; Instructor in Mathematics, University of Missouri, 1903-6, Assistant Professor of Mathematics, 1906—.

ALAN ESTIS FLOWERS, M. E.,

Assistant Professor of Electrical Engineering.

University Scholar, Cornell University, 1898-1900, M. E., 1902; Construction Department, Westinghouse Electric and Manufacturing Company, 1902-3, Engineering, Apprentice, 1904, Testing Department, Summer, 1905; Engineering Office, Bullock Electric Mfg. Co., Summer, 1907; Instructor in Electrical Engineering, University of Missouri, 1904-6, Assistant Superintendent, Light and Heat Station, 1907-8, Assistant Professor of Electrical Engineering, 1906—.

†ARTHUR HENRY ROLPH FAIRCHILD, A. B., A. M., Ph. D.,
Assistant Professor of English.

A. B., University of Toronto, 1900; Teaching Fellow, University of Wisconsin, 1900-1; Scholar, Yale University, 1901-3, A. M., 1903, Fellow, 1903-4, Ph. D., 1904; Instructor in English, University of Missouri, 1904-7, Assistant Professor of English, 1907—.

MURRAY SHIPLEY WILDMAN, A. B., Ph. D.,
Assistant Professor of Economics.

A. B., Earlham College, 1893; Teacher of History and Economics, Spiceland Academy and Normal School, 1893-5; Cashier of the Henry County Bank, Spiceland, Indiana, 1895-7, Vice President, 1897-1901; Superintendent of Spiceland Academy and Normal School, 1898-1901; Graduate Student, University of Chicago, 1901-4, Fellow in Political Economy, 1902-4, Ph. D., 1904; Professor of History and Economics, Central College, 1904-5; Instructor in Economics, University of Missouri, 1905-6, Assistant Professor of Economics, (in charge 1906-8), 1906—.

HENRY LAMAR CROSBY, B. A., A. M., Ph. D.,
Assistant Professor of Greek.

B. A., University of Texas, 1901, M. A. 1902, Fellow in Greek and Latin, 1901-2; A. M., Harvard University, 1903, Ph. D., 1905; Instructor in Greek, University of Pennsylvania, 1905-6; Assistant Professor of Greek, University of Missouri, 1906—.

WILLIAM MORTON DEY, B. A., M. A., Ph. D.,
Assistant Professor (in charge) of Romance Languages.

B. A. and M. A., University of Virginia, 1902; Student in Paris, May-September, 1903; A. M., Harvard University, 1904, Austin Teaching Fellow in Romance Languages, 1905-6, Ph. D., 1906; Studying and traveling in Spain, Summer, 1906; Assistant Professor of Romance Languages, University of Missouri, 1906—, in charge, 1908—.

WILLIAM ALVAN MILLER, B. S.,
Assistant Professor of Railway Engineering.

B. S. in C. E., University of Missouri, 1897; Rodman, U. S. Deep Waterway Survey, 1897-8, Chief of Party, 1898-9; Transitman on Engineer Corps, Baltimore and Ohio S. W. R. R., 1899-01; Resident Engineer, Choctaw, Oklahoma and Gulf R. R., 1901-02; Assistant on Engineer Corps, B. and O. S. W. R. R., 1902-03, Assistant Division Engineer, 1903-6; Assistant Professor of Railway Engineering, University of Missouri, 1906—.

ROSCOE HART SHAW, B. Sc.,
Assistant Professor of Dairy Husbandry.

B. Sc., New Hampshire College, 1897; Diploma Eidgenn. Polytechnikum, Zurich, Switzerland, 1899; Assistant Chemist, New Hampshire Experiment Station, 1899-1900; Acting Chemist, Wisconsin Experiment Station, 1900-01; Assistant in Chemistry, University of Wisconsin, 1901-2; Assistant Chemist, Kansas Experiment Station, 1902-Jan. 06; Assistant Professor of Agricultural Chemistry, University of Nebraska and Associate Chemist, Nebraska Experiment Station, Jan.-July, 1906; Dairy Expert, United States Department of Agriculture, 1906—; Assistant Professor of Dairy Husbandry, University of Missouri, 1906—.

†Absent during session of 1908-9.

ARTHUR LORD WESTCOTT, B. M. E., M. E.,

Assistant Professor of Experimental Engineering.

B. M. E., Purdue University, 1892, M. E. 1906, Assistant in Shop Work, 1892-3; Instructor in Mechanical Engineering, Michigan Agricultural College, 1893-9; Professor of Mechanical Engineering, University of Montana, 1899-1903; Mechanical Engineer with Browning Engineering Co., Cleveland, Ohio, 1903-5, with Brown Hoisting Machinery Co., 1905; Assistant Professor of Mechanical Engineering, Case School of Applied Science, 1905-6; Assistant Professor of Experimental Engineering, University of Missouri, 1906—.

ELEXIOUS THOMPSON BELL, B. S., M. D.,

Assistant Professor of Anatomy.

B. S., University of Missouri, 1901, M. D., 1903, Fellow in Anatomy, 1901-2, Assistant in Anatomy, 1902-3; Student at University of Bonn, 1905-6; Instructor in Anatomy, University of Missouri, (in charge, 1903-4), 1903-7, Assistant Professor of Anatomy, 1907—.

EDWIN ALLAN FESSENDEN, B. S. in M. E., M. E.,

Assistant Professor of Mechanical Engineering.

American Brake Company (Westinghouse), St. Louis, Summers, 1901-2; Assistant Mechanical Engineer, National Candy Company, 1903; Washington University, 1903; B. S. in M. E., University of Missouri, 1904, M. E., 1906; Chief Draughtsman, Aetna Foundry and Machine Company, Springfield, Illinois, 1904-5; Draughtsman, Babcock and Wilcox Co., Stirling Dep't, Barberton, Ohio, Summer, 1907; Instructor in Mechanical Engineering, University of Missouri, 1905-7, Assistant Professor of Mechanical Engineering (in charge 1907-9), 1907—.

HERBERT SHAW PHILBRICK, A. B., S. B.,

Assistant Professor of Mechanical Engineering in Charge of Shops.

A. B., Colby College, 1897; Sub-Master High School, Calais, Maine, 1897-1900, Principal, 1900-1902; S. B., Massachusetts Institute of Technology, 1906; Draughtsman, Watersville Ironworks, Summer of 1905; Draughtsman, Keys Fibre Co., Summer of 1906; Engineer, with A. O. Lombard Company, 1906-1907; Assistant Professor of Mechanical Engineering in Charge of Shops, University of Missouri, 1907—.

GEORGE MATTHEW REED, A. B., A. M., Ph. D.,

Assistant Professor of Botany.

A. B., Geneva College, 1900; A. M., University of Wisconsin, 1904, Ph. D., 1907; Professor of Natural Science, Amity College, 1900-03; Assistant in Botany, University of Wisconsin, 1904-7, Instructor in Botany, 1907; Assistant Professor of Botany, University of Missouri, 1907—.

HERBERT MEREDITH REESE, A. B., Ph. D.,

Assistant Professor of Physics.

A. B., Johns Hopkins University, 1897, Fellow in Physics, 1899-1900, Ph. D., 1900; Fellow in Astronomy, Lick Observatory, University of California, 1900-1, Assistant, Lick Observatory, 1901-3; Assistant, Yerkes Observatory, University of Chicago, 1903-4; Instructor in Physics, University of Missouri, 1904-7, Assistant Professor of Physics, 1907—.

THOMAS JAMES RILEY, A. B., A. M., Ph. D.,

Assistant Professor of Sociology.

A. B., Baker University, 1900, A. M., 1903; Ph. D., University of Chicago, 1904, Fellow, 1900-1, 1902-4; Professor and Acting Head of the Department of Mathematics, Baker University, 1901-2; Professor and Head of the Department of Mathematics, Western State Normal School, Kaiaimazoo, Mich., 1904-6; Director, St. Louis School of Philanthropy, 1906—; Instructor in Sociology, University of Missouri, 1906-7, Assistant Professor of Sociology, 1907—.

WILHELMUS DAVID ALLEN WESTFALL, A. B., Ph. D.,

Assistant Professor of Mathematics.

A. B., Yale University, 1901; Ph. D., Goettingen, 1905; Douglass Fellow, Yale University, 1901-2; Instructor in Mathematics, in Yale College, 1902-3; Student at Goettingen, 1903-5, and 1907-8; Instructor in Mathematics, University of Missouri, 1905-7, Assistant Professor of Mathematics, 1907—.

WERRETT WALLACE CHARTERS, A. B., Ph. M., Ph. D.,

Assistant Professor of Education.

A. B., McMaster University, 1898; B. Paed., Toronto University, 1901; Ph. M., Chicago University, 1903, Ph. D., 1904; Student, Ontario Normal College, 1898-9; Principal of Hamilton, Canada, Model School, 1899-1902; Supervisor of Practice Teaching, Winona, Minn., Normal School, 1904-7; Acting Professor of Theory and Practice of Teaching, University of Missouri, 1907-8; Assistant Professor of Education, 1908—.

JOSEPH DOLIVER ELLIFF, A. B., A. M.,

Inspector of Schools, and Assistant Professor of School Administration.

Graduate, Warrensburg State Normal School, 1893; A. B., University of Missouri, 1903; A. M., 1907; Principal Central School, Carthage, Missouri, 1893-4; Principal Joplin, Missouri, High School, 1894-7; Superintendent Joplin Public Schools, 1897-1902; Acting Superintendent of St. Joseph, Missouri, Public Schools, 1903-4; Student, University of Chicago, Summer Quarters, 1905 and 1906; Instructor in School Administration, and Inspector of Accredited Schools, University of Missouri, 1904-08, Inspector of Schools, and Assistant Professor of School Administration, 1908—.

ROBERT BANKS GIBSON, Ph. B., Ph. D.,

Assistant Professor of Physiological Chemistry.

Ph. B., Yale University, 1902, Ph. D., 1906; Sheffield Scholar in the Graduate School of Yale University, 1902-3; Research Assistant in the Sheffield Scientific School, 1903-4; Bacteriologist in the Research Laboratory of the Department of Health of the City of New York, 1904-7; Instructor in Physiological Chemistry, University of Missouri, 1907-8, Assistant Professor of Physiological Chemistry, 1908—.

JAY WILLIAM HUDSON, Ph. D.,

Assistant Professor of Philosophy.

A. B., University of California, 1905, A. M., 1906; A. M., Harvard University, 1907, Ph. D., 1908; Assistant in Philosophy, University of California, 1904-6; Major Assistant in Philosophy, Harvard University, 1907-8, Resident John Harvard Fellow in Philosophy, 1908-9 (resigned); Assistant Professor of Philosophy, University of Missouri, 1908—.

CHESTER MURRAY, Ph. B., Ph. D.,

Assistant Professor of Romance Languages.

Ph. B., Cornell University, 1899, Ph. D., 1908; Student in Paris, summer, 1899; Fellow in Romance Languages, Cornell University, 1899-1900; Student in Germany (Freiburg, Goettingen), France (Paris), Italy, May, 1900-October, 1902; Instructor in Romance Languages, Cornell University, 1903-8; Student in France and Italy, May-October, 1907; Assistant Professor of Romance Languages, University of Missouri, 1908—.

INSTRUCTORS.

†CARL CONRAD ECKHARDT, Ph. B., M. A., Ph. D.,

Instructor in History.

Ph. B., Ohio State University, 1902; Assistant in History, University of Michigan, 1902-3, M. A., 1904; Student, Cornell University, Summer, 1905, Graduate Scholar in History, 1906-7, Ph. D., 1908; Assistant in History, University of Missouri, 1903-5, Instructor in History, 1905—.

LOUIS INGOLD, A. B., A. M., Ph. D.,

Instructor in Mathematics.

Student Assistant in Mathematics, University of Missouri, 1900-1, A. B., 1901, Teaching Fellow in Mathematics, 1901-2, A. M., 1902; Fellow, University of Chicago, 1905-7, Ph. D., 1907; Acting Assistant Professor of Mathematics, University of Missouri, 1902-3, Assistant in Mathematics, 1903-5, Instructor in Mathematics, 1905—.

HOWARD VERNON CANTER, A. B., Ph. D.,

Instructor in Latin.

A. B., Washington and Lee University, 1896; Associate Principal and High School Instructor in Latin, French and German, Lexington, Virginia, Public Schools, 1895-98; Fellow, Johns Hopkins University, 1900, Ph. D., 1904, Fellow by Courtesy, 1904; Professor of Latin and Greek, Notre Dame of Maryland, 1902-4; Classical Master, University School, Baltimore, 1904-5; Instructor in Latin, University of Missouri, 1905—.

CAROLINE MCGILL, A. B., A. M., Ph. D.,

Instructor in Anatomy.

A. B., University of Missouri, 1904, A. M., 1905, Ph. D., 1908, Student Assistant in Zoology, 1902-4, Fellow in Zoology, 1904-5, Acting Instructor in Anatomy, 1905-6, Instructor in Anatomy, 1906—.

†Absent during session of 1908-9.

† SAMUEL DAVID GROMER, S. B., Pe. B., A. M.,

Instructor in History.

S. B., Pe. B., University of Missouri, 1889; Superintendent of Schools, Ipswich, South Dak., 1889-91; State Institute Conductor, South Dak., 1890-1; Instructor in History, Political Science and Economics, Stanberry Normal, 1891-6, 1897-1904; Commissioner of Schools, Gentry Co., 1893-7; Graduate Student, University of Chicago, 1896; Student, Chautauqua College of Liberal Arts, 1897-8; A. M., Harvard University, 1905; Student at Columbia University, completing residence requirements for Ph. D., 1905-6; Instructor in History, College of the City of New York, 1906; Instructor in History and Economics, University of Missouri, 1906-7; Instructor in History, 1907—; Treasurer of Porto Rico, 1907—.

JAMES WILLIAM PUTNAM, Ph. B., A. M.,

Instructor in Economics.

Ph. B., Illinois College, 1894; Graduate Student, University of Chicago, 1895 and Summer Quarters, 1900, 1901 and 1903; Instructor in History and Political Science, Illinois College, 1894-8, Assistant Professor (in charge) of History and Economics, 1898-1902; Fellow, Cornell University, 1902-3, A. M., 1903; Assistant and Graduate Student, University of Wisconsin, 1903-4; Instructor in Economics and Administration, Northwestern University, 1904-6; Instructor in Political Science and Economics, University of Missouri, 1906-7; Instructor in Economics, 1907—.

MARLOW ALEXANDER SHAW, A. B., Ph. D.,

Instructor in English.

A. B., University of Toronto, 1896, Fellow, 1897-8; Fellow, University of Wisconsin, 1900-01; Scholar, Harvard University, 1901-3, Ph. D., 1903; Principal, Elementary Schools, Waubaushene, Ontario, 1889-91; Assistant in English, University of Missouri, 1905-6, Instructor in English, 1906—.

WILLIAM GODFREY BEK, A. B., A. M., Ph. D.,

Instructor in Germanic Languages.

A. B., University of Missouri, 1903, A. M., 1905; University Scholar, University of Pennsylvania, 1903-4, Harrison Fellow in Germanics, 1905-7, Ph. D., 1907; Instructor in German, Summer Session, University of the South, 1904; Instructor in Germanic Languages, University of Missouri, 1907—.

FRANCIS WILLIAM COKER, A. B.,

Instructor in Political Science.

A. B., University of North Carolina, 1899; Teacher, Webb School, Tennessee, 1899-1901; Student, Harvard University, 1901-2, A. B., 1902; Teacher, Miller School, Virginia, 1902-3; Student, Columbia University, 1904-7, University Fellow in Political Philosophy, 1905-6; Instructor in Political Science, University of Missouri, 1907—.

† Absent during sessions of 1907-9.

OTTO DUNKEL, A. B., A. M., Ph. D.,

Instructor in Mathematics.

M. E., University of Virginia, 1896, Assistant in Leander McCormick Observatory, 1896-7; B. A., M. A., University of Virginia, 1898; A. M., Harvard University, 1899, Ph. D., 1902; Instructor in Mathematics, Wesleyan University, Middletown, Conn., 1902-4; Student, University of Goettingen, 1904-5, University of Paris, 1905-6; Instructor in Mathematics, University of Minnesota, 1906-7; Instructor in Mathematics, University of Missouri, 1907—.

HELENE M. EVERS, A. B., A. M., Ph. D.,

Instructor in Romance Languages.

A. B., Washington University, 1899; A. M., University of Missouri, 1902, Fellow in Romance Languages, 1902-3; Fellow in Romance Languages, Bryn Mawr College, 1903-5, Ph. D., 1905; Acting Instructor in Romance Languages, University of Missouri, 1905-6; Teacher of French, Miss Gleim's School, Pittsburgh, 1906-7; Instructor in Romance Languages, University of Missouri, 1907—.

JAMES ANDREW GIBSON, A. B., A. M.,

Instructor in Analytical Chemistry.

A. B., Harvard University, 1902, A., M. 1904, Assistant in Chemistry, 1902-4; Assistant in Chemistry, Harvard University and Radcliffe College, 1904-5; Instructor in General and Analytical Chemistry, Case School of Applied Science, 1905-7; Instructor in Analytical Chemistry, University of Missouri, 1907—.

J. F. McCLENDON, B. S., M. S., Ph. D.,

Instructor in Zoology.

Assistant in Zoology, University of Texas, 1900-3, B. S., 1903, Fellow in Zoology, 1903-4, M. S., 1904; Harrison Fellow in Zoology, University of Pennsylvania, 1904-6, Ph. D., 1906; Professor of Physics and Biology, Randolph-Macon College, 1906-7; Resident Naturalist of the Marine Biological Laboratory of San Diego, Cal., 1907; Instructor in Zoology, University of Missouri, 1907—.

CLARENCE PERKINS, A. B., A. M., Ph. D.,

Instructor in European History.

A. B., Syracuse University, 1901; A. M., Harvard University, 1904, Ph. D., 1908; Instructor in History, Bloomfield (N. J.) High School, 1901-03; Graduate Student of History, Harvard University, 1903-06, Thayer Scholar, 1904-05, Edward Austin Fellow, 1905-06, Non-Resident Graduate Student in London, Oxford and Paris and Ozias Goodwin Memorial Fellow, 1906-07; Instructor in European History, University of Missouri, 1907—.

ROBERT LEE RAMSAY, A. B., Ph. D.,

Instructor in English.

A. B., Fredericksburg College, 1890, Assistant in English, 1898-1900; Student Assistant in English, Johns Hopkins University, 1903-4, Fellow, 1904-5, Ph. D., 1905, Assistant in English, 1905-7; Instructor in English, University of Missouri, 1907—.

FRANK FLETCHER STEPHENS, Ph. B., Ph. M., Ph. D.,

Instructor in American History.

Ph. B., University of Chicago, 1904, Ph. M., 1905; Harrison Fellow in American History, University of Pennsylvania, 1905-7, Ph. D., 1907; Instructor in History, University of Maine, Summer School, 1907; Instructor in American History, University of Missouri, 1907—.

† ERNEST VANCOURT VAUGHN, B. L., A. M.,

Instructor in History.

B. L., University of Missouri, 1900, A. M., 1904, Teaching Fellow in English, 1900-1; Instructor in History, Columbia High School, 1901-3; Superintendent of Schools, Milan, Missouri, 1904-5; Instructor in History, Kirksville Normal, Summer Quarter, 1905; Assistant in History, University of Missouri, 1905-07, Instructor in History, 1907—.

FREDERICK VALENTINE EMERSON, A. B., Ph. D.,

Instructor in Geology.

A. B., Colgate University, 1898; Teacher in Steelton and Ardmore (Penn.) High Schools, 1898-1903; Assistant in Geology, Cornell University, 1903-4; Scholar, Harvard University, 1904-5; Fellow, University of Chicago, 1905-6, Ph. D., 1907; Assistant in Geology, University of Missouri, 1906-7, Instructor in Geology, 1908—.

GILBERT CAMPBELL SCOGGIN, A. B., A. M., Ph. D.,

Instructor (in charge) in Sanskrit and Comparative Philology.

A. B., A. M., Vanderbilt University, 1902; Ph. D., Harvard University, 1906; Instructor in University School, Nashville, Tennessee, 1902-4; Shattuck Scholar, Harvard University, 1904-6; Master in Greek, Hotchkiss School, Lakeville, Conn., 1906-7; Student at Munich and Leipzig, 1907-8; Instructor in Sanskrit and Comparative Philology, University of Missouri, 1908—.

ELI STUART HAYNES, A. B., A. M.,

Instructor in Astronomy.

A. B., University of Missouri, 1905, A. M., 1907, Assistant in Mathematics, 1905-6, Gould Assistant in Astronomy, 1906-7, Assistant in Astronomy, 1907-8, Instructor in Astronomy, 1908—.

HARVEY CLAYTON RENTSCHLER, A. B., A. M., Ph. D.,

Instructor in Physics.

A. B., Princeton University, 1903, A. M., 1904; Fellow in Experimental Science, Princeton University, 1903-04, Instructor in Physics, 1904-05; Graduate Student in Physics, Johns Hopkins University, 1905-08; Instructor in Physics, Pennsylvania College, spring term 1907; Ph. D., Johns Hopkins University, 1908; Instructor in Physics, University of Missouri, 1908—.

† Absent during session of 1908-1909.

GENERAL STATEMENT.

Organization:

Graduate instruction is offered in the College of Arts and Science, Teachers College, School of Agriculture, and Department of Engineering. The Graduate work of the College of Arts and Science is under the direction and control of the Graduate Conference of that College. The graduate work of the other departments is under the direction of the respective Faculties.

Admission:

Graduates of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities, and (in exceptional cases by special permission of the faculty) other persons of liberal education, are admitted to the Graduate Department. Admission to this Department, however, shall not be understood, as implying admission to candidacy for advanced degrees, which is subject to the regulations indicated below.

Persons desiring to pursue graduate work in the College of Arts and Science are admitted by the Chairman of the Graduate Conference of that College. In other departments graduate students are admitted by the respective Deans. These officials will furnish special information regarding the graduate work of their respective departments.

Fees and Expenses:

Students are required to pay a library and incidental fee of \$5. Those who enter after the first week of either semester must pay an additional fee of \$5 for late registration. Students taking laboratory work must make small laboratory deposits. Non-residents of Missouri are required to pay a tuition fee of \$10 a semester. The estimated cost of room rent and board for students living in Lathrop or Benton Hall, the dormitories for men, varies, according to the room, from \$2.30 to \$2.80 a week. In Read Hall, the dormitory for women, it varies, according to the room, from \$4.50 to \$5.25 a week. The total necessary expenses of a student living in the dormitories for men need not exceed \$150 a year; for women living in Read Hall, they need not exceed \$225. The necessary expenses for students living in private families vary from \$3 to \$5 a week.

University Fellowships and Scholarships:

The University offers annually a number of University Fellowships yielding stipends of \$250, and University Scholarships with stipends of \$150. University Fellows and Scholars are exempt from payment of library and incidental fees and of all fees and deposits in the subject in which they hold fellowships and scholarships. These exemptions increase the value of the fellowships and scholarships by at least \$200 when comparison is made with those in institutions which require the payment of high tuition fees. These fellowships and scholarships will be awarded to the applicants who are best prepared and are of the highest promise in scholarship, irrespective of the lines of work they may desire to pursue. It is expected that fellows and scholars will be prepared for graduate work in the subject which they elect, and that they will devote themselves mainly to the work in this subject. They will do no teaching, but may be called upon to render a limited amount of service to the University in other ways. University fellows and scholars are allowed to engage in outside work only with the consent of the dean of the department and of the professor of the subject which they elect. The Executive Board upon the recommendation of such a dean and professor, may deprive any student of his fellowship or scholarship, whenever it may appear that he is not devoting himself as he should to his work as a fellow or scholar. Applications must be filed not later than April 1, in order to receive consideration in the award for the next Academic year. Applications received after this date and not later than June 1, will be considered in filling any vacancies which may occur in the fellowships or scholarships. Application blanks may be obtained from the Registrar of the University, and, when filled out, should be sent to the President of the University, Columbia, Missouri.

Curators' Scholarships:

By order of the Board of Curators, the student who attains the highest grade, or who shall be first in merit, in taking a Bachelor's degree, in the graduating class of any of the colleges or universities composing the Missouri College Union, will be admitted to any department of this University for the first year without the payment of any tuition, library, or incidental fee.

Literary and Scientific Societies:

A number of literary and scientific societies are maintained in the University.

The following, conducted by members of the faculties, are open to advanced students: "The Scientific Association," organized with a "General Section" and special Sections of "Biological Science," "Mathematical and Physical Science," and "Social and Political Science," "The Philological Club," "Mathematical Journal Club," and "Zoological Field Club."

The following are conducted by students, in some cases with the participation of members of the faculties: "Athenaeum," "Union Literary," "Bliss Lyceum," "Missouri State University Debating Club," "New Era Debating Club," "Medical Society," "Agricultural Society," "Engineering Society," "Der Deutsche Klub," "Sketch Club," "Asterisk Club," "English Club," "History Club," "Students' Meeting of the American Institute of Electrical Engineers."

Publications:

The "University of Missouri Studies," the "Bulletin of the Laws Observatory" and a series of special publications are maintained as a means of publishing the results of original research in the University by instructors and graduate students.

Laboratories and Museums:

Laboratories. Facilities for practical instruction in the sciences are provided in the following laboratories: Agronomy, Animal Husbandry, Anatomy, Astronomy, Bacteriology, Botany, Chemistry (including Agricultural Chemistry and Experiment Station work), Dairy Husbandry, Engineering (Civil, Electrical, Sanitary and Mechanical), Entomology, Experimental Psychology, Geology, and Mineralogy, Horticulture, Internal Medicine, Mathematics, Pathology, Pharmacology, Phonetics, Physics, Physiology, Physiological Chemistry, Surgery, Veterinary Science and Zoology.

Museums. There are also museums of Agriculture, Art, Classical Archaeology, Ethnology, Geology and Zoology.

University Libraries:

The University libraries comprise the general library and many departmental libraries. They contain about 100,000 volumes. Students have access also to the library of the State Historical Society of some 23,000 volumes.

The annual catalogue, which contains further information about the University and its several Departments, may be obtained from the University Publisher, Columbia, Missouri.

I. ARTS AND SCIENCE.

Regulations Governing the Degree of Master of Arts:

The degree of Master of Arts is offered to students who have spent at least one year exclusively devoted to advanced courses of study, and who have submitted an acceptable dissertation and passed all prescribed examinations.

A student wishing to make application for the degree must fill out a blank form, provided for the purpose, and must present it to the Chairman of the Graduate Conference on or before October 1.

In order to be accepted by the Conference as a candidate for the degree, the student must give evidence that he has completed such a liberal undergraduate course of Academic study as is offered by colleges of good standing, and that he has received a baccalaureate degree in Arts or Science equivalent to the baccalaureate degree of the University of Missouri.

In making application the student must indicate the subject of the dissertation and the course of study selected by him on the form referred to above, which must bear the signature of approval of the professor in charge of his major subject, before it is presented to the Graduate Conference for its action. He may, however, defer submitting the subject of the dissertation to the Conference until November 1.

The candidate must choose a major subject, to which he must devote the greater part of his time during the year, and also such other subjects as may be approved. A majority of all work represented in the course of study must be selected from the groups designated as *Primarily for Graduates*.

A dissertation evincing capacity for original research and independent thought in the subject of the major work must be submitted to the Conference for approval on or before May 1. The student should consult the Chairman of the Graduate Conference for information regarding the form in which the dissertation must be presented.

The attention of students is called to the fact that graduate work can not be subjected to rigid regulation, and the Graduate

Conference reserves the right to deal with each case on its individual merits.

With the approval of the professors concerned, such candidates as have fulfilled all requirements may, at the close of the year, be recommended by the Graduate Conference to the Board of Curators for the degree of Master of Arts.

Regulations Governing the Degree of Doctor of Philosophy:

1. *General Statement.*

The degree of Doctor of Philosophy is offered to students who have pursued advanced courses of academic study, without serious interruption, for a period of at least three years, and who have submitted an acceptable dissertation and passed all prescribed examinations.

In order to be accepted by the Graduate Conference as a candidate for the degree of Doctor of Philosophy, the student must give evidence that he has completed a liberal undergraduate course of academic study such as is offered by colleges of good standing, and that he has received a baccalaureate degree in Arts or Science equivalent to the baccalaureate degree of the University of Missouri.

The Conference reserves the right to decide in each case whether the antecedent training has been satisfactory, and, if any of the years of advanced work have been passed away from this University, whether they may be properly regarded as spent in university studies under suitable guidance and favorable conditions. Private study, or study pursued at a distance from libraries and laboratories, will not be considered as equivalent to university work. In any case the student must spend the year immediately preceding his final examinations in residence at the University of Missouri.

It should be emphasized that the requirements for this degree are not computed in terms of time and courses, but that the degree is conferred only upon such students as have reached, after long study, a high attainment in some special branch of learning and have given the clearest evidence of their ability to carry on independent, original research by reason of having made an actual contribution to knowledge of a character approved by competent judges.

2. *Acceptance of Candidates.*

A student wishing to make application for the degree of Doctor of Philosophy must fill out a blank form, provided for the purpose, secure thereto the signatures of the instructors with whom he desires to take his major and minor subjects and present it to the Graduate Conference for approval on or before October 1. He must also give satisfactory evidence of ability to translate French and German at sight.

3. *Requirements for the Degree.*

(a) *Subjects of Study*—Every candidate for the degree must select one principal or major subject, and at least one and not more than two subordinate or minor subjects, the combination to be approved by the Graduate Conference. The instructor with whom the student is taking his major subject acts as his official adviser and has the general direction of his work.

The student's principal work must be in the major-subject. Although no regulations are laid down with respect to the time to be devoted to the major and minor subjects, in general it may be stated that the major subject should represent two-thirds of the student's entire time.

(b) *Dissertation*—The dissertation, embodying the results of original investigation, must be written upon a subject approved by the adviser, and must be submitted to the Conference, legibly written or typewritten, on or before May 1, when it becomes the property of the University. The student should consult the Chairman of the Conference for information regarding the form in which the dissertation must be presented.

Upon receiving the dissertation a committee is appointed whose duty it is to report upon it in writing to the Conference.

The candidate is required to print or publish the dissertation, with such revision as the Conference may allow, and he shall present one hundred and fifty copies of the work to the library of the University. The conference shall take any necessary action to insure the publication of the dissertation within one year after the conferring of the degree. A brief biographical sketch of the writer must be appended to the dissertation.

(c) *Examinations*—A committee, consisting of the professor of the candidate's major subject and the professors of his minor subjects, is appointed to take charge of all examinations, and to report upon the same to the Conference in writing.

In addition to final written examinations the candidate may be required to take an oral examination in the presence of the Faculty.

The candidate may, with the approval of the professors in charge, take the examinations in his minor subjects upon the completion of his work in these subjects, but the final examination in the major subject cannot be taken until the dissertation has been approved and accepted.

(d) *Conferring of Degree*—Upon the satisfactory completion of all requirements, the candidate may be recommended by the Graduate Conference to the Board of Curators for the degree of Doctor of Philosophy.

COURSES OF INSTRUCTION.

(Courses preceded by a number with the letter a attached, thus: 4a, 6a, are given the first semester only. Those preceded by a number with the letter b attached, thus: 4b, 6b, are given the second semester only. Those preceded merely by a number are continuous courses and are given both semesters. The number of hours credit given for a course for each semester is indicated by the Arabic numerals following the statement of the course. For courses primarily for undergraduates, see the University Catalogue.

DIVISION OF CLASSICAL LANGUAGES.

CLASSICAL ARCHAEOLOGY AND THE HISTORY OF ART.

Professor PICKARD.

Primarily for Graduates.

14. *Topography and Monuments of Athens.* Frazer's Pausanias will be taken as the basis of discussion. A reading knowledge of Greek, French and German required. (2.)

15. *Archaeological Seminary.* Hours and work to be arranged.

For Undergraduates and Graduates.

5. *History of Modern Belgian, Modern Dutch, and American Painting.* Lectures and collateral reading. Critical study of representative pictures by means of lantern slides, photographs and other reproductions. (2.)

6. History of Greek Art. A preliminary study of Assyrian and Egyptian Art, followed by a study of the development of Greek Architecture and Sculpture. Lectures, collateral readings, essays, with constant use of the lantern, photographic reproduction, and models and casts in the Museum of Classical Archaeology. Greek History (Greek 6a) is recommended to the students of this course. (3.)

7a. Mycenaean Art or Art of Primitive Greece. The earliest discoveries at Mycenae, Tiryns and elsewhere will not be neglected but special attention will be given to the most recent publications on Troy, Crete, and the Argive Heræum. (1.)

8b. Introductory Study of Greek Vases and Vase Paintings. Reference book, Pottier's Catalogue of the Louvre Vase Collections. (1.)

While a knowledge of the Greek Language is not an absolute prerequisite for 7a and 8b, these courses are intended for advanced students in Greek.

9. Etruscan and Graeco-Roman Art. This course should be preceded by course 6. It will deal with the earliest art of the Italian Peninsula, endeavor to show how this art reached its highest development among the Etruscans, how Etruscan influenced early Roman Art, how later Roman Art grew out of early Roman and late Greek Art modified by the circumstances and character of the Romans. Roman History (Latin 12b) is recommended to students in this course. (2.)

10. Roman Life. A systematic study of the topography of Rome and of extant remains particularly of Rome and Pompeii. Lectures and readings. Illustrated by the use of plans, maps, and lantern slides. As supplementary to this course, Roman Public and Private Life (Latin 5) is recommended. (2.)

11. History of Renaissance Painting. First Semester: Italian Painting. Second Semester: Painting of the Netherlands and of Germany. This course should be preceded or accompanied by History 1. With Italian Painting, History 25b is also earnestly recommended. (3.)

13. Masterpieces of Architecture, Sculpture and Painting of Classical, Renaissance and Modern Times. Lectures fully illustrated with the stereopticon. This course aims to show the historical

development of art by the discussion of some of the finest examples in each of the three divisions mentioned. (1.)

As supplementary to all courses offered in the history of Painting and of Sculpture the Theory of Representation (Free Hand Drawing) is recommended.

Museum of Classical Archaeology:

The museum occupies the third floor of the west wing of Academic Hall. It is supplied with models of temples representing the three orders of Greek Architecture, and with plaster casts of representative specimens of Greek and Roman Sculpture. These are arranged chronologically, and on the walls are hung many framed photographs of other works of classic art. Several original specimens of Egyptian Sculpture have been recently added to the museum. The museum possesses a large number of unframed photographs and an extensive collection of lantern slides.

Renaissance and Modern Painting:

The collection of photographs, lantern slides, and other means of illustrating courses in these subjects have been very largely increased during the past year. For reproducing the color of the originals a *Kromskop* and lantern slides made by the *trichrome* process are used. The picture gallery near the Museum of Classical Archaeology is hung with carbon photographs, photogravures, and other reproductions of masterpieces of painting.

GREEK.

Professor MANLY; Assistant Professor CROSBY.

Primarily for Graduates.

15. **Hesiod and Homeric Hymns.** Students should provide themselves with Hesiodi Carmina ed. A. Rzach, Teubner, Leipzig and Hymni Homerici ed. A. Baumeister, Teubner, Leipzig. (3.) Professor MANLY.

16. **Homer.** The whole of the Iliad and Odyssey will be read during the year with especial attention to the antiquities. A special subject will be assigned each student for investigation. Teubner text editions of the poems should be secured in advance. (2) or (3.) Professor MANLY.

17a. **Historical Greek Grammar.** This course will be devoted to study of the principal Greek dialects in their relationship to one-

another, covering general questions of phonology, the inflection of noun and verb, and kindred matters. The work will consist of lectures, the reading and interpretation of dialectic inscriptions, and reports on special topics to be assigned from time to time. The student will provide himself with Solmsen's *Inscriptiones Graecae ad illustrandas dialectos selectae*. Other works used in the course will be found in the general library. (2) or (3.) Assistant Professor CROSBY.

18b. **Plato.** The Protagoras, Meno, Phaedo, and Phaedrus will be read, in part or entire. The course is intended primarily for those who have a ready reading knowledge of Greek of the classical period. Peculiarities of style and diction will be commented on as occasion demands, but more stress will be laid on content. Attention will be paid to the author's place in philosophy, and the student is referred for an account of his predecessors to Zeller's larger *History of Greek Philosophy*. (2) or (3.) Assistant Professor CROSBY.

19. **Seminary.** This work will be conducted jointly by Professor Manly and Assistant Professor Crosby, and will be adapted to the needs of the graduate students in attendance.

For Undergraduates and Graduates.

13a. **The Greek Theater.** The origin and development of the Greek Theater will be considered, and disputed points in the structure of the theater, and in the presentation of plays will be discussed. The basis of the work will be Doerpfeld and Reisch's *Das Griechische Theater*. (1.) Professor MANLY.

14b. **Aristophanes.** Selected comedies will be read, and the origin and development of comedy will be considered. Attention will also be given to the life of the people as revealed in the plays. (2) or (3.) Assistant Professor CROSBY.

LATIN.

Professor JONES; Assistant Professor JOHNSTON; Dr. CANTER.

Primarily for Graduates.

15. **Seminary.** Lucretius. An interpretation of the *De Rerum Natura* with special reference to the literary models and sources followed, the language and the technique of the poem, manuscripts, editions, etc. (3.) Professor JONES.

17. **Seminary.** The Hecyra of Terence. (3.) Assistant Professor JOHNSTON.

18. **Cicero.** Rhetorical writings. Each member of the class will be assigned a linguistic subject for investigation. (2.) Assistant Professor JOHNSTON.

19. **Petronius.** The Cena Trimalchionis will be read as a basis for studies in the *sermo plebeius*. (3.) Dr. CANTER.

20. **Roman Historiography.** Representative selections will be read from all the more important authors and periods. The course will include a study of ultimate and documentary sources, the beginnings of Roman history as a department of literary art, its aims, methods and general character. (3.) Dr. CANTER.

21. **Roman Epigram.** Its rise and development as a department of literature. (2.) Dr. CANTER.

24. **Latin Metre.** During the first semester especial attention will be given to the metre of comedy and dactylic hexameter—during the second semester to Lyric measures. (1.) Assistant Professor JOHNSTON.

For Undergraduates and Graduates.

6. **Catullus, Martial and the Elegiac Poets.** Must be preceded by courses 1, 3, and 5. (3.) Dr. CANTER.

9. **Roman Drama (Plautus and Terence).** Must be preceded by courses 1, 3, and 5. (3.) Assistant Professor JOHNSTON.

10. (a) **Tacitus, Annals;** (b) **Seneca.** Must be preceded by courses 1, 3, and 5. (3.) Dr. CANTER.

11. **Roman Literature. Characteristic Selections.** Must be preceded by courses 1, 3, and 5. (Not offered in 1909-1910.) (2.) Assistant Professor JOHNSTON.

20a. **Introduction to Latin Palaeography.** Includes the reading of facsimiles. (1.) Dr. CANTER.

20b. **Introduction to Latin Epigraphy.** Includes a study of representative inscriptions. (1.) Dr. CANTER.

SANSKRIT AND COMPARATIVE PHILOLOGY.

Dr. SCOGGIN.

Primarily for Graduates.

5. **Vedic Sanskrit.** First Semester: Introduction to Vedic literature. Selections from the Hymns of the Rig-Veda. Second Semester: Selections from the Hymns of the Atharva-Veda. (3.)

6. **Classical Sanskrit.** First Semester: Rapid reading of the Hitopadeśa. Lectures on Sanskrit literature. Second Semester: Sanskrit lyric poetry. Reading of Kālidāsa's Meghadūta and selections from Bhartri-hari. (3.)

7. **Pāli.** First Semester: General introduction to the language and literature. Henry's Précis de Grammaire Pālie. Selections in Dines Anderson's Pāli Reader. Second Semester: Selections. Lectures on Pāli literature. Not offered in 1909-10. (3.)

9a. **Old Persian.** In this course the Old Persian cuneiform inscriptions will be read and studied with constant reference to Sanskrit. Not offered in 1909-10. (3.)

For Undergraduates and Graduates.

1. **Elementary Sanskrit.** First Semester: Elements of the language. Translation of Sanskrit into English and English into Sanskrit. Thorough drill in forms. Whitney's Grammar, Lanman's Reader, and Perry's Primer. Second Semester: Reading of easy texts. Epic literature and the fables. Translation at sight. Lanman's Reader. (3.)

2. **Comparative Grammar of Greek and Latin.** This course is so divided that either semester may be taken independently of the other. The historical development of both Greek and Latin will be traced and these languages will be compared. Frequent reference will be made also to other Indo-European tongues. During the first semester the basis of the work will be Historical Greek Grammar. The chief facts of phonology, and noun and verb inflection will be set forth in systematic lectures. Each student will report from time to time on assigned subjects. The latter part of the course will be devoted to the interpretation of dialectic inscriptions interesting for language and content. During the second semester Latin sounds and inflections will form the basis

of the work, and the method pursued will be similar to that of the first semester. (3.)

3a. General Introduction to the Science of Language. This course is intended for students of all departments who have linguistic interests and gives general preparation for advanced work in any of the languages, ancient or modern. It is conducted by means of lectures, assigned reading, and reports. Among the topics dealt with in the lectures are, the history and methods of the comparative study of language, the origin of language, the relation and distribution of the languages of the earth, analogy, phonetic and semantic change. (3.)

DIVISION OF MODERN LANGUAGES.

ENGLISH.

Professor ALLEN; Professor BELDEN; Assistant Professor FAIRCHILD;
Dr. SHAW; Dr. RAMSAY.

Primarily for Graduates.

15. Beowulf. The study of the poem will be pursued as an exercise in Old English phonology, in text-criticism, and in the investigation of poetic principles. (3.) Professor BELDEN.

20. Literary Criticism. The history of critical theory will first be traced in outline and some of the standard works read. This will be followed by more distinctly constructive work, in which the problems of criticism will be considered and an attempt made to determine the grounds of literary judgment. (3.) Assistant Professor FAIRCHILD.

21. The Change of Literary Taste in England in the Seventeenth Century. An attempt will be made to trace out in some detail the canons of poetry of Jonson, Donne, Herbert and Vaughan, Herrick and the Caroline song-writers, Cowley, and Waller. Special attention will be given to verse form. (2.) Professor BELDEN.

22. The Pre-Shakespearean Drama. From the beginning of the modern drama in the liturgical plays of the tenth century, through the English miracles, moralities, and interludes, to the immediate predecessors of Shakespeare. (3.) Dr. RAMSAY.

23. Elizabethan Drama. History of the earlier Elizabethan

Drama; study of the works of Lyly, Kyd, Greene, Peele, and Marlowe. (3.) Assistant Professor FAIRCHILD.

25. **Seminary.** Subject for 1909-10, Chaucer.

For Undergraduates and Graduates.

5. **English Literature of the Eighteenth Century.** First Semester: Dryden and Pope. Second Semester: Swift and the Essayists. (3.) Professor BELDEN.

7. **Shakespeare.** Six to eight selected plays; class room reading and interpretation. A thesis is required. (3.) Assistant Professor FAIRCHILD.

8. **Shakespeare.** The course will be devoted to the history of Shakespeare criticism and to the study of some of the formal elements of the plays (technique, language, versification, etc.). Should be taken in conjunction with or after course 7. (2.) Assistant Professor FAIRCHILD.

9. **Tennyson and Browning.** The complete works of Tennyson and most of the poetry of Browning will be studied. (3.) Dr. SHAW.

10. **American Literature.** (a) Sectional development; (b) growth of nationality; (c) present tendencies. The leading writers in prose and verse will be considered, first, as to their intrinsic worth; and secondly, as illustrative of national development. (3.) Professor BELDEN.

11a. **History of the English Language.** Lectures and textbook. (3.) Professor ALLEN.

12. **Anglo-Saxon.** Prose and Poetry. (3.) Professor ALLEN.

13b. **Middle English.** The development of the language is studied in its principal dialects from the Norman Conquest to and including the English of Chaucer, with lectures and translation of representative selections from each period of the Middle English literature. (2.) Dr. RAMSAY.

14b. **Study of Modern Prose Style, based upon the works of twelve representative Authors.** Essays and reports. (2.) Professor ALLEN.

17. **Recent and Current English Literature.** The representative writers and literary movements in England from about 1875 to the present day will be studied, principally by lectures and

reports. During the first semester the later Victorian poets, novelists, and essayists will be considered, with special emphasis upon Stevenson, Meredith, Hardy, and Kipling. The second semester will be devoted to a study of the chief movements still in progress, Realism and Naturalism, Symbolism, Nationalism, as manifested in contemporary drama, fiction, and poetry. (3.) Dr. RAMSAY.

This course is open only to students who have taken 3 and either 4 or 9.

GERMANIC LANGUAGES.

Professor ALMSTEDT; Professor HOFFMAN; Assistant Professor STEWART; Dr. BEK.

Primarily for Graduates.

11. **German Literature of the Second Half of the 19th Century.** This course will consist of lectures and reports. During the first semester Hebbel, Ludwig, Freytag, and Wagner will be especially emphasized. The minor authors will be treated in lectures. The second semester will be devoted to a study of the realistic writers of Germany, especially Hauptmann, Sudermann, Wildenbruch and Fulda. The foreign influence on these writers will be carefully considered. (2.) Dr. BEK.

12b. **Romanticism.** This course is intended to comprise an exhaustive study, as far as is possible, of German romanticists and their works; and to show the relation of this movement to similar ones in other literatures. (2.) Professor HOFFMAN.

13a. **The Reformation and Renaissance (1500-1750).** This course is to give the student a clear view of the development and decline of the literary tendencies, forms and ideals of this period, and the influences that helped to develop them or to accelerate their decline. (2.) Professor HOFFMAN.

14. **Middle High German (Introductory Course).** First Semester: Hartman von Aue. Second Semester: Walther von der Vogelweide. Discipline in phonology, morphology, syntax; comparison of mediaeval with modern idiom; a study in lyric poetry. (2.) Professor ALMSTEDT.

15b. **History of the Nibelungenlied.** This course is to comprise a study of the various theories as to the origin and authorship

of the poem, the controversies in regard to it, and its relation to the Nibelungensaga and other sagas. A reading knowledge of Middle High German is required. (2.) Professor HOFFMAN.

16b. **Old High German.** Phonology and forms; critical reading of Old High German texts. Prerequisite, Course 19. Texts: Braune, *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*. (5.) Professor ALMSTEDT.

17a. **Old Norse.** Phonology and forms; critical reading of one or more sagas. Prerequisite: Gothic (Course 19). Texts: Kahle, *Altisländisches Elementarbuch* and Heusler, *Zwei Isländer-Geschichten*. (2.) Professor ALMSTEDT.

18b. **Old Saxon.** Phonology and forms: critical reading of the *Heliand*. A desirable prerequisite: Gothic (course 19). (2.) Professor ALMSTEDT.

19a. **Gothic.** Phonology, morphology, and syntax; reading from Ulfilas; the relationship of Gothic to Indo-European and to later Germanic dialects, general introduction to the study of Germanic Philology. (5.) Professor ALMSTEDT.

20. **Current Publications.** (1.) Assistant Professor STEWART.

21. **Seminary.** Subject to be determined. For special students only. (2.)

For Undergraduates and Graduates.

5a. **Outline Course in German Literature.** The aim of the course is to acquaint the student with the most important works and movements in the evolution of German literary life. (2.) Dr. BEK.

6a. **Lessing.** Lectures on Lessing's life and works; intensive study of Lessing the dramatist and the critic; essays written in German. Course conducted in German. (5.) Assistant Professor STEWART.

7a. **Schiller.** This course will consist in the study of Schiller's *Jungfrau von Orleans*, *Maria Stuart*, *Braut von Messina*, *Wilhelm Tell*, *Wallenstein*; essays in German, based on the texts; Lectures on Schiller's life and works. Course conducted in German. (5.) Professor HOFFMAN.

8b. **Goethe.** Lectures on Goethe's life and works; intensive

study of Goethe's prose, poetry, and dramas; essays written in German. Course conducted in German. (5.) Professor ALMSTEDT.

9b. **Outline Course in Historical Grammar.** This course together with 4a is arranged to meet the needs of the prospective teacher of German. Though a knowledge of the older periods is desirable, it is not required. (2.) Assistant Professor STEWART.

10a. **Deutsche Aufsätze und Stilübungen.** Advanced course in German theme-writing; discussions of grammatical, syntactical, and stylistic points. This course is intended for teachers of German or for students who propose to become teachers of German; conducted in German. (2.) Professor HOFFMAN.

Any other courses in Germanic Languages and Literatures will be arranged if the needs of the students require it.

ROMANCE LANGUAGES.

Assistant Professor DEY (*in charge*); Assistant Professor MURRAY;
Dr. EVERS; Dr. HAMILTON.

French.

Primarily for Graduates.

12. **Seminary in French Literature.** Detailed study of some literary movement or representative writer. (2.) Assistant Professor DEY or Assistant Professor MURRAY.

14. **General Introduction to Romance Philology.** (2.) Assistant Professor DEY or Assistant Professor MURRAY.

15. **Old French.** Open to those who have had course 14. (2.) Assistant Professor MURRAY.

16. **Seminary in Romance Philology.** Provençal, Old Spanish, Old Italian. (2.) Assistant Professor DEY and Assistant Professor MURRAY.

For Undergraduates and Graduates.

6. **French Literature.** A general outline of its various periods. Lectures, reading, reports. Open to those who have had course 3 (see general catalogue of the University) or its equivalent. This course is preliminary to courses 7, 8, 9a, 9b, and 11. (3.) Assistant Professor DEY.

7. **The Seventeenth Century.** Lectures, reading, reports. Open to those who have had course 6 or its equivalent. This course

alternates with course 8. To be given in 1909-10. (3.) Assistant Professor MURRAY.

8. **The Eighteenth Century.** Lectures, reading, reports. Open to those who have had course 6 or its equivalent. This course alternates with course 7. To be omitted in 1909-10. (3.) Assistant Professor MURRAY.

9a. **The Nineteenth Century.** The Romantic and other movements down to recent times. Lectures, reading, reports. Open to those who have had course 6 or its equivalent. (3.) Assistant Professor DEY.

9b. **The Nineteenth Century.** Recent literature. Lectures, reading, reports. Open to those who have had course 6 or its equivalent. (3.) Assistant Professor MURRAY.

10. **The Language and Literature down to the Sixteenth Century.** Lectures. Open to those who have had course 6 or its equivalent. (1.) Assistant Professor MURRAY.

11. **The Sixteenth Century.** Lectures, reading, reports. Open to those who have had course 10. (2.) Mr. _____.

Italian.

Primarily for Graduates.

Italian Philology. See courses 14 and 16.

For Undergraduates and Graduates.

21. **Dante, Petrarch, Boccaccio.** (3.) Assistant Professor MURRAY.

22. **The Sixteenth Century.** Pulci, Boiardo, Tasso, Ariosto, etc. (2.) Assistant Professor MURRAY.

Spanish.

Primarily for Graduates.

Spanish Philology. See courses 14 and 16.

For Undergraduates and Graduates.

32. **The Sixteenth and Seventeenth Centuries.** Cervantes, Lope de Vega, Calderón. (2.) Assistant Professor DEY.

DIVISION OF PHILOSOPHY AND EDUCATION.

EDUCATION.

Professor HILL; Assistant Professor COURSAULT; Assistant Professor CHARTERS.

Advanced courses of study in the History and Principles of Education and Educational Psychology are counted in fulfillment of the requirements for graduate degrees in the College of Arts and Science.

For courses of study see statement of Teachers College, p. 65.

EXPERIMENTAL PSYCHOLOGY.

Professor MEYER; Assistant Professor HUDSON; Mr. SISSON.

Primarily for Graduates.

9a or b. **Psychological Seminary and Advanced Laboratory Work.** Critical reading of recent literature. Discussion of special problems and theories. Research work.

For Undergraduates and Graduates.

These courses are open only to students who have had an introductory course in General Psychology.

2a or b. **Experimental Didactics.** Application of the methods of the psychological laboratory to problems of instruction and training in schools and colleges. (3.)

3a or b. **Differential Psychology.** A study of individual differences in character and intelligence, their causes, and their practical significance in life, particularly in school, in civil service, and in legal practice. (3.)

4a or b. **General Esthetics.** An experimental as well as theoretical study of the psychological laws underlying our appreciation of the beautiful, chiefly in the arts of painting, sculpture, and architecture, and also in nature. No familiarity with the technic or history of art is required. The aim of this course is to develop in the student an independent judgment in questions concerning the beautiful. (3.)

5a or b. **Theory of Music.** The esthetic laws of music. The psychological differences between primitive and highly developed music, and between European and exotic music. (3.)

6a or b. **Advanced Psychology.** Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. (3.)

7a or b. **Comparative Psychology.** Mental development in the child and the race. Experimental methods of child study. Dawning intelligence during animal infancy. Experiments upon the mental processes of animals. Instinct and physical heredity. Theories of mental evolution. (2.)

8a or b. **Abnormal Psychology.** The abnormalities of mental life resulting from inborn, pathological, or artificial causes (such as idiocy, aphasia, apraxia, somnambulism, hypnosis, etc.) and their educational, medical and forensic significance. (2.)

Psychological Laboratory:

The psychological laboratory is well equipped with instruments. It consists of ten rooms, all connected by telephone wires, furnished with gas and electricity and four with water. The rooms are used for the purposes indicated. One office, one lecture room, one work shop, one room for the study of animals, one dark room for optical work; one room for work in odor and taste chiefly, three rooms for work on visual, auditory and other sensations and experiments in general, one dark room used for storage only.

PHILOSOPHY.

Professor LOVEJOY; Assistant Professor HUDSON.

Primarily for Graduates.

23. **Seminary: The Conception of Evolution.** A historical study, from the sources, of the origins and early development of the conception in modern cosmology and biology and in the philosophy of history; and a critical examination of its philosophical implications and its legitimate bearing upon metaphysics and ethics. (2.) Professor LOVEJOY.

21. **Kant.** The course may be taken by suitably prepared students either as a one-hour course, in which case the work will consist in the reading of the *Kritik der reinen Vernunft* in either English or German, the preparation of analytical outlines of that treatise, and attendance at fortnightly meetings (2 hours) of the course; or as a two-hour course, in which case the ethical writings of Kant and selections from the *Kritik der Urteilkraft* will also

be read, and a final thesis on some selected topic required. Professor LOVEJOY.

For Undergraduates and Graduates.

3a. Ethical Theory. An introductory study of the main problems of ethics and of the chief methods of their solution, with constant reference to the principal historic schools for illustration and interpretation. The following topics will be included: the nature and method of ethics as a philosophical discipline; freedom; the ground of obligation; conscience; the highest good; utilitarianism; hedonism; intuitionism; energism; egoism and altruism; optimism and pessimism. Lectures, prescribed reading and fortnightly conferences. (3.) Assistant Professor HUDSON.

3b. Problems in Applied Ethics. An examination, in the light of systematic ethical theory, of several controverted problems of morals: the limits of moral compromise; the liberty of the individual, its grounds and limits; the ethical nature and rôle of the State; the ethics of the economic relations and of the distribution of wealth; the ethics of international relations. (3.) Professor LOVEJOY.

7. English Philosophy from Hobbes to Hume. Survey of the principal movements of English thought in the later seventeenth and the eighteenth century; Hobbes, the English Platonists, Locke, the general presuppositions of the philosophy of the Enlightenment, Shaftesbury, the Deistic controversy, Clarke, Berkeley, Butler, Hutcheson, Adam Smith, Hume. Emphasis will be laid chiefly upon the relation of the writings studied to ethics and the philosophy of religion. (2.) Professor LOVEJOY.

8b. German Idealism. Kant, Fichte, Schelling, Hegel and Schopenhauer. (3.) Assistant Professor HUDSON.

Graduate students in Philosophy are advised to fix upon one of the three following subjects as the point of principal emphasis in their study: I. Logic and Metaphysics; II. Ethics; III. History of Philosophy. This choice should determine in the main the student's election of courses in other departments. The complementary courses advisable in each case should be determined after consultation with the Professor of Philosophy. In general for those who choose I, some advanced work in Mathematics, in Physics and in Biology is particularly desirable; for those who

choose II, work in Economics (especially in the Theory of Value), in Sociology, and in Political Theory; for those who choose III, work in Political History, in the History of Economics, in the History of Political Theories, and in some branch of the History of Literature. These recommendations are, however, to be taken as suggestions rather than as prescriptions.

DIVISION OF HISTORY AND POLITICAL SCIENCE.

ECONOMICS.

Professor DAVENPORT; Assistant Professor WILDMAN; Mr. PUTNAM.

Primarily for Graduates.

9a. **Financial History of the United States.** A study of the financial operation of the Federal Government from the organization of the Treasury Department to the present time. Various phases of our financial practice will be examined. (2) to (3). Assistant Professor WILDMAN.

9b. **Crises and Depressions.** The object of this course is to make a careful analysis of certain important financial crises in order to determine the nature and causes of such disturbances. Open to students who have had at least two courses out of 5, 9a and 11. (2) to (4). Assistant Professor WILDMAN.

10b. **Problems of Labor.** A study of the special problems and interests of wage earners, such as the organization and policies of trades-unions, employers' associations, arbitration, profit-sharing, factory acts and other forms of labor legislation. (3) to (5). Mr. PUTNAM.

11. **Advanced Economic Theory.** An examination of the writings of the most prominent economists from the time of Adam Smith to the present with the purpose of constructing an adequate theory of value. Professor DAVENPORT.

12. **Seminary.** Assistant Professor WILDMAN.

13. **Seminary.** Professor DAVENPORT.

13b. **Advanced Finance.** A critical examination of (1) the various theories as to the limits of State activity; (2) Various ethical systems as related to the problem of Justice in Taxation; (3) Proportional vs. Progressive taxation; (4) The later developments in Value Theory as bearing on the more difficult problems

of Incidence: (5) The administrative aspects of Income Taxation: (6) Ethical, legal, and constitutional aspects of Franchise and Corporation Taxation: (7) The practicability of a scientific articulation of the various taxes under American conditions. (3) to (5). Professor DAVENPORT.

14. **History of Economics.** A first-hand study of authors and documents, with especial reference to the background of political and industrial conditions and of philosophical thought. (2) to (5). The student is advised to correlate this course with related courses in Philosophy, Political Science, History and Sociology. Professor DAVENPORT.

15a. **Economics of Socialism.** A consideration of the essential features of the socialistic program from the standpoint of economic conditions and economic theory. An examination will be made of some of the writings of representatives of different types of socialistic thought. Particular attention will be given to those of Karl Marx and of the leaders of modern French and German Socialism. (2) to (4). Mr. PUTNAM.

For Undergraduates and Graduates.

4a. **Public Finance.** While this course is chiefly concerned with the principles of taxation, such problems as those of public expenditures, budgetary practice, and the proper relations of the State to industry and trade are also involved. This course is open to those who have taken course 1 in Economics, and should be followed by course 9b in Political Science, and 4b in this department. (3.) Mr. PUTNAM.

5. **Money Credit and Banking.** This course is concerned with the origin and history of Money, and the scientific principles involved in Monetary Theory. The purpose will be to form correct notions regarding the nature and importance of a proper standard of value and system of currency. A study of the principles of Banking and Credit will be illustrated by a comparison of the banking systems and methods of leading nations. (2) to (3). Assistant Professor WILDMAN.

6b. **Economics of Transportation.** A history of the development of transportation agencies, and a study of the principles of rate-making and rate-regulation. (3.) Mr. PUTNAM.

7b. **Industrial Organization.** This course is chiefly concerned

with the nature and development of the modern industrial corporation. Attention will be directed to problems of organization and management, the relations of stock-holders, bond-holders and patrons. (2.) Mr. PUTNAM.

8a. **Insurance.** The general principles, the different forms of personal and property insurance and the main problems connected with each. (2.) Professor DAVENPORT.

HISTORY.

Professor TRENHOLME; Professor VILES; Dr. STEPHENS; Dr. PERKINS.
Primarily for Graduates.

44. **Seminary in Modern European History.** This course will afford an opportunity for well prepared students to follow out some special line of research in the field of modern history. The topics will be carefully selected by the instructor to meet the conditions of library resources. A knowledge of at least one modern language, other than English, will be absolutely necessary in this course. (2), (3) or (4). Dr. PERKINS.

42. **Seminary in English, Social, Institutional, and Legal History.** A course affording opportunity for original research in these fields. The University Library and the Law Library both contain valuable material for research work in English History. (2), (3) or (4). Professor TRENHOLME.

43. **Seminary in Medieval History.** A research course in which students will be required to investigate some special topic in the history of the Middle Ages, to be selected by the instructor and student in accordance with the resources of the library. Some knowledge of Latin will be requisite, and ability to use French and German will be desirable. (2), (3) or (4). Professor TRENHOLME.

41. **Seminary in American History.** A research course in selected topics in American Colonial History and the political and institutional development of the United States. In the assignment of topics an effort will be made to follow the individual preferences of students. (2), (3) or (4). Professor VILES.

40. **Seminary in Missouri History.** A course affording opportunity for investigation in Missouri History. Every student will be expected to investigate from the sources some topic in the narrative or political history of Missouri, to embody the results of his study

in written form, and, at the option of the instructor, report to the class. In the assignment of topics preference will be given, as far as possible, to the interests and leanings of the individual student. (2), (3) or (4). Professor VILES.

35b. Studies in United States History. A study of selected topics in United States History. Lectures, discussion, and reports by the class. (2) or (3). Professor VILES.

34a. American Colonial Institutions. A course on the development of representative institutions, local government, the judiciary, etc., from their origins in English institutions of the sixteenth, and seventeenth centuries to the Revolutionary war. The aim of the course is to trace the growth of the political institutions and ideals underlying the present government of the United States. Reports will be required from every student from time to time. This course should be preceded by the narrative course on the Colonial period. (2) or (3). Professor VILES.

36. Research Studies in European Culture. An advanced course of seminar character open to students who are qualified to pursue graduate work. Reports will be assigned from time to time in the history of Medieval and Renaissance culture and extensive reading in sources and secondary literature will be required. Omitted in 1909-10. (2) or (3). Professor TRENHOLME.

33b. English Constitutional and Legal History Since the Norman Conquest. A continuation of course 32a dealing with later institutions. (2) or (3). Professor TRENHOLME.

32a. English Constitutional and Legal History to the Norman Conquest. A study of early English institutions from the sources and best secondary works. Lectures, reports, and discussions. (2) or (3). Professor TRENHOLME.

30a. History of Political Theories to the Sixteenth Century. A lecture and report course dealing with the chief political writers of ancient and medieval times and tracing out the origin and development of the principal theories of state to the sixteenth century. The student is advised to correlate this course with related courses given by other departments of this Division. (2) or (3). Professor TRENHOLME.

31a. Diplomatic History of the United States. A study of the foreign relations of the United States from the close of the

Revolution to the present time. Special attention will be given to the relations with France and England during the formative period, to the Monroe Doctrine and its subsequent development, to relations with the Latin-American states, and to questions connected with the Civil War and the expansion following the Spanish-American struggle. (3.) Dr. STEPHENS.

For Undergraduates and Graduates.

26b. **The Era of the Reformation.** A survey of the causes, events, and consequences of the religious revolutions of the sixteenth century, with special attention to the influence of the German Reformation on politics and society. Attention will be directed to the political, social, and economic aspects of the period as well as to the religious changes. (3.) Dr. PERKINS.

Courses 25b and 26b will usually be given in alternate years. In 1909-10 course 25b will probably be given.

25b. **The Culture and Civilization of the Renaissance.** A course dealing with the rise of Italian Humanism and the spread of the Renaissance throughout Europe generally. Special attention will be given to the literature, religion, society, and art of the period. Symond's *Short History of the Renaissance* and Van-Dyke's *Age of the Renaissance* are recommended as hand books for students. Students who elect this course are advised to take also course 11, in the History of Art. (2) or (3). Professor TRENHOLME.

24a. **The Culture and Civilization of the Middle Ages.** A course dealing with the history and development of culture and civilization among the German nations of Europe and in the territories of the old Roman Empire during the medieval period. Special attention will be paid to educational, literary, social, and religious aspects of the age. This course logically precedes courses 25b and 26b. (2) or (3). Professor TRENHOLME.

22a. **American Social History: Colonial Period.** A study of the development of American society from the founding of the first settlements and colonies to the Revolution. Especial attention will be given to manners, customs, and social institutions generally and an effort made to trace the growth of the colonial population in civilization. (2) or (3). Professor VILES.

23b. **American Social History: United States Period.** A con-

tinuation of course 20a dealing with the history of American society since the Revolution. (2) or (3). Dr. STEPHENS.

21b. **History of France since the Sixteenth Century.** This course will be a continuation of 20a, and will deal with the political and institutional history of France from about the year 1500. (2) or (3). Dr. PERKINS.

20a. **History of France to the Sixteenth Century.** This course deals with French history from the Treaty of Verdun to the reign of Francis I. The leading events of the period and the chief features of constitutional development will be treated in detail, special emphasis being laid on the rise and development of the French Monarchy. Ability to read French will be desirable but not essential. (2) or (3). Dr. PERKINS.

19b. **History of Germany Since the Protestant Revolt.** A continuation of course 18a, in which the modern history of Germany will be covered in as thorough a manner as possible. The causes, events, and results of the Thirty Years War, the rise of Prussia, and her part in eighteenth century history, Germany and Napoleon, and the formation of the present German Empire will be among the chief topics considered. (2) or (3). Dr. PERKINS.

18a. **History of Germany to the Close of the Protestant Revolt.** A course especially designed for students of German language and literature who wish a general knowledge of German history. The origin and early history of the people of Germany will be first taken up and then a careful study made of the policies, institutions, society and commerce of the German portion of the Holy Roman Empire, and finally, the story of the Protestant Revolt in Germany will be carefully studied to the religious peace of Augsburg in 1555. A reading knowledge of German while desirable will not be essential. (2) or (3). Dr. PERKINS.

The courses in French and German history will usually be given in alternate years. In 1909-10 the course in French history will be given.

15b. **History of Missouri.** After a brief survey of French exploration and colonization in the Mississippi valley, of the Spanish regime, and the early settlements, the Louisiana Purchase and its causes will be taken up in more detail. The primary aim of the course, however, will be to give an account of the development

of Missouri since 1803, of the progress of settlement, and of the political and narrative history. Every student will be expected to prepare several reports. This course must be preceded by a course in United States history. (3.) Professor VILES.

14a. **History of the West.** A course in advanced American history dealing with the growth of the west in political and economic importance. Especial attention will be given to the history of the Mississippi valley and such topics will be treated as the causes and history of the westward migration, frontier life and ideals, the development of territorial and state governments, public lands and public improvements, racial elements in the population, and the reaction of the middle west on national politics and history. This course will be conducted by means of lectures and topical discussions based on assigned readings. (3.) Professor VILES.

11. **History of the United States.** An advanced course in the political, constitutional, and social history of the United States since 1763, taking up the development of parties and political ideals, foreign relations, territorial expansion, the slavery question, and the general development of the nation. (3.) Professor VILES.

10. **Modern European History.** A course designed for students who desire a fuller acquaintance with modern European History than course 1 gives. The political, social, and institutional history of Europe from the close of the Thirty Years War to the present time will be carefully studied from secondary works and sources, with special attention to the period of French ascendancy, the rise of the great modern states, their causes, events, and results of the French Revolution, the Napoleonic era, and the development of nationality and constitutional government in the nineteenth century. The course will be conducted by means of lectures and discussions based on assigned reading. (3.) Dr. PERKINS.

POLITICAL SCIENCE AND PUBLIC LAW.

Professor LOEB; Mr. COKER.

Primarily for Graduates.

6. **Comparative Administrative Law.** A study of the general principles of administrative law in the United States, England, France, and Germany. The structure and functions of central and

local administration will be studied in detail. The legal relations of administrative officers will be considered with special reference to the United States. (2.) Mr. COKER.

7b. **Colonial Government.** A study of the present government and administration of the colonies of the United States and of the chief states of Europe. (2.) Not given in 1909-10. Mr. COKER.

8a. **The Government of Missouri.** A study of the constitutional development of the state from the Louisiana Purchase to the present time, followed by a consideration of the organization and functions of the institutions of the central and local governments. (2.) Professor LOEB.

9b. **The Law of Taxation.** A study of the legal rules regulating taxation in the central and commonwealth governments of the United States. The student is advised to correlate this course with related courses in Economics. (2.) Professor LOEB.

10b. **History of Political Theories Since the Sixteenth Century.** A study of the development of ideas of the state and political relations from the time of Bodin to the present. Special attention will be devoted to the theories of Hobbes, Locke, Montesquieu, Rousseau, and the nineteenth century publicists and philosophers of Germany, England and France. The study of American political philosophy will be based chiefly on the writings of leading statesmen. The student is advised to correlate this course with related courses in History, Philosophy and Sociology. (2.) Mr. COKER.

20. **Seminary in Administration.** A course for the investigation of administrative organizations and functions. In 1909-10 topics in Missouri administration will be studied from the sources. (2), (3) or (4). Professor LOEB.

For Undergraduates and Graduates.

3b. **Elements of Jurisprudence.** An introduction to the study of law. This course treats of the nature, sources and classification of law, and includes a consideration of the fundamental concepts of private law. The nature and use of legal authorities will be discussed. (2.) Professor LOEB.

4. **Comparative Constitutional Law.** A comparative study of the constitutional law of the principal states of Europe and America. Particular attention will be given to the field of indi-

vidual liberty defined in the Constitution of the United States and interpreted in the decisions of the Supreme Court. (3.) Professor LOEB.

5. **Municipal Government.** A comparative study of the organization, functions, and administration of cities of Europe and the United States. During the latter part of the course special topics will be taken up in more detail, such as: central control over cities, municipal elections, municipal revenue, the regulation of public utilities, and municipal ownership. (2.) Mr. COKER.

SOCIOLOGY.

Professor ELLWOOD; Assistant Professor RILEY.

Primarily for Graduates.

20. **Advanced Sociology.** A critical study of sociological theory with some attempt to make use of psychological principles in the interpretation of social phenomena. Lectures, discussions, and theses by the class. (3.) Professor ELLWOOD.

25. **Anthropology and Ethnology.** A study of the evolution of man as an animal, and of the evolution and relations of the different races of mankind. (2.) Professor ELLWOOD.

26. **Ethnic Psychology.** A study of the comparative psychology of races as shown in their customs, institutions, and social organization. Not given in 1909-10.

27a. **The Negro in America.** A study of the social, economic, moral, and educational conditions among the negroes of the United States. (3.) Assistant Professor RILEY.

30. **History of Social Philosophy.** Lectures on the development of social thought from Aristotle to the present, especially since the time of Comte. Assigned reading. The student is advised to correlate this course with related courses in Economics, History, Political Science and Philosophy. (3.) Professor ELLWOOD.

32a. **Social Condition of the Laboring Classes.** A review of the social effects of the Industrial Revolution and of the present factory system. (2.) Assistant Professor RILEY.

33b. **Sociology of Socialism.** An historical and critical study of socialism since the French Revolution from the sociological standpoint. (3.) Assistant Professor RILEY.

35b. Social Statistics. A course in statistical method with practical work on selected problems. (2.) Assistant Professor RILEY.

40. Seminary. Research work along sociological and philanthropic lines. (2), (3) or (4). Professor ELLWOOD and Assistant Professor RILEY.

For Undergraduates and Graduates.

10a. Modern Charity. A study of the nature and origin of the dependent and defective classes, the principles and methods of prevention and of relief, the management of institutions, etc. Reports by the class on special subjects for investigation. Additional work will be required of graduate students. (3.) Assistant Professor RILEY.

11b. Criminal Sociology. A study of the causes, nature, and treatment of crime; the principles of criminal anthropology, criminal jurisprudence, and penology. Lectures and selected textbooks. Additional work will be required of graduate students. (3.) Professor ELLWOOD.

12b. Preventive Philanthropy. An intensive study of some specific problems in preventive work, including a study of child problems, playgrounds, child labor, and the juvenile court. (2.) Assistant Professor RILEY.

15a. Rural Communities. A study of the social conditions in American agricultural communities with a view to their improvement. (2.) Assistant Professor RILEY.

16b. Urban Communities. A study of the social conditions in American urban communities, with special reference to the satisfying of communal needs. (2.) Assistant Professor RILEY.

18b. Social Aspects of Education. A study of the bases and aims of education from the standpoint of sociology, and the demands of sociology upon subject matter and methods in education. (2.) Assistant Professor RILEY.

DIVISION OF BIOLOGICAL SCIENCES.**ANATOMY AND HISTOLOGY.**

Professor JACKSON; Assistant Professor BELL; Dr. MCGILL.

Primarily for Graduates.

10. **Investigation.** Problems of original research will be assigned in Anatomy or Histology. A reading knowledge of French and German is required. Hours to be arranged.

For Undergraduates and Graduates.

7b. **Topographic Anatomy.** A study of the topography of the various organs by means of serial sections through the body. Open only to students who have completed the undergraduate courses in Anatomy. Laboratory. (3.)

8b. **Advanced Human Embryology.** Based upon a study of human and other mammalian embryos, especial attention being paid to organogenesis and histogenesis. The elementary courses in Anatomy, Histology, and Embryology are necessary as preparation for this course. One lecture and two laboratory periods a week. Hours to be arranged.

9. **Advanced Anatomy.** Advanced work in Anatomy or Histology. Hours to be arranged. A seminary (which may be taken separately if desired), is held once a week.

BOTANY.

Professor GAGER; Assistant Professor REED.

Primarily for Graduates.

16. **Seminar.** A weekly conference of the departmental staff and advanced students. Reports on investigations in progress, and discussion of current botanical literature. A reading knowledge of German and French is desirable. (1.) Professor GAGER.

17. **Research.** Opportunity for investigation is offered along the following lines: Physiology, morphology, experimental evolution and heredity, mycology and plant pathology, local flora. Professor GAGER; Assistant Professor REED.

For Undergraduates and Graduates.

7a. **The Physiology of Plant Nutrition.** Lectures and laboratory work, covering such topics as absorption, digestion, trans-

location, nitrification, the synthesis of carbohydrates and proteins, and respiration. (3.) Professor GAGER; Mr. BOVIE.

8b. **Experimental Morphology.** The first part of the course will be devoted to a study of normal growth and structure and their modification by environmental factors; the second part to adaptation and ecological anatomy. Course 7a is advised as preliminary. (3.) Professor GAGER; Mr. BOVIE.

9b. **Advanced Mycology.** Special work on the physiology, morphology, and classification of the fungi is offered to students who have had course 2a or its equivalent. Laboratory and weekly conferences. Credit according to the amount of work done. Assistant Professor REED.

10b. **Diseases of Plants.** A course of illustrated lectures and demonstrations on the diseases of plants. Especial attention is given to methods of infection, the effect upon the host-plant, and, to a certain extent, the means of combating the organisms which cause diseases of garden crops, cereal grains, and fruit- and timber-trees. (1.) Laboratory work may be elected under course 9b. Assistant Professor REED.

11a. **Advanced Bacteriology.** A course of lectures on the micro-organisms and processes concerned in the more common fermentations, as alcoholic, lactic and acetic acid; the relation of bacteria to the processes of decay; their importance with reference to agriculture, and plant and animal diseases. (1.) Assistant Professor REED.

12a. **Advanced Bacteriology.** Laboratory work along the lines indicated in course 11a. Credit according to the amount of work done. Assistant Professor REED.

13. **Cytology and Embryology.** A study of the genesis of gametes and spores, fertilization, and the development of the embryos of representative green plants. Laboratory, conferences, and reports upon assigned readings. Three hours or less. One or two semesters. Professor GAGER.

14. **Evolution.** A study of the principles and theories of organic evolution as applied to plants. Conferences, and reports upon field work and assigned reading. (1.) One or two semesters. Professor GAGER.

15. **Special Problems.** Intended primarily for those who

contemplate graduate research. Laboratory work upon a definite topic, together with a survey of the pertinent literature. Bi-weekly reports and conferences. May be elected more than once. (2 or more.) Professor GAGER; Assistant Professor REED.

PHYSIOLOGY.

Professor GREENE; Assistant Professor GIBSON; Mr. COFFIN.

Primarily for Graduates.

7a or 7b. **Toxicology.** (2) or (3). Assistant Professor GIBSON.

8. **Journal Club.** (1.) Professor GREENE.

9a. **The Pharmacology of the Circulatory System.** (3.) Professor GREENE.

10. **Advanced Physiology.** Advanced courses in Physiology, Physiological Chemistry and Pharmacology. Individual problems will be assigned to students of sufficient preparation. Hours to be arranged. Professor GREENE; Assistant Professor GIBSON.

11. **Investigation.** Opportunity is offered for research into questions of current interest. Professor GREENE; Assistant Professor GIBSON.

For Undergraduates and Graduates.

4b. **Physiological Chemistry.** An advanced course supplementing and extending course 2a. The preparation and chemistry of the proteins; a qualitative and quantitative study of the tissues and secretions, of enzymes, of putrefaction and putrefactive products; analyses of typical foods, and the detection of food preservatives and adulterants. The prosecution of a short investigation and formal report on the same are required. (4.) Assistant Professor GIBSON.

5b. **Pharmacology.** This course presents the physiological action of drugs from the experimental point of view. The demonstrations are made on man and the lower animals. (4.) Professor GREENE; Assistant Professor GIBSON; Mr. COFFIN.

6b. **General and Comparative Physiology.** The phenomena of irritability; the effects of chemico-physical forces upon the physiological processes of protoplasm. Introductory courses in Physiology and Zoology are required. (2) or (3).

ZOOLOGY.

Professor LEFEVRE; Professor CURTIS; Dr. McCLENDON.

Primarily for Graduates.

11. **Research.** Special investigation of unsolved problems of Zoology in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is essential. Hours to be arranged in accordance with the requirements of individual students.

12. **Seminary.** Meetings at which subjects of zoological investigation are reported and discussed by instructors and students. Each student is required to give at least six lectures during the year, and experience is thus gained in presenting, in the form of lectures, the results of reading and research. For the session of 1909-10 the following subjects will receive special attention in the work of the Seminary: experimental evolution and heredity, and the behavior of organisms. A reading knowledge of French and German is essential. (1.)

For Undergraduates and Graduates.

6a or 6b. **Comparative Embryology of Invertebrates.** A comparative study of the structure and development of representative forms from the principal phyla of the invertebrates, including a consideration of general phylogenetic and morphological problems. (3.) Professor CURTIS.

7b. **Cytology.** A study of the cell, with special reference to problems of development and inheritance. Cytological technique. (3.) Dr. McCLENDON.

8a. **Experimental Zoology.** A course in Zoology, with special reference to the physiological aspect, and including: influence of environment on structure and on life-cycles, response to stimuli, and experiments on growth, regeneration, and development. (3.) Dr. McCLENDON.

9a. **Experimental Evolution and Heredity.** A course of lectures dealing with the experimental study of evolution and heredity. Emphasis is laid on the phenomena of hybridization, including Mendelian inheritance, the origin of species by mutation, and the influence of the environment upon the race. (2.) Professor LEFEVRE.

10b. **History of Zoology.** A course of lectures on the historical foundation of zoological science, and the origin and development of modern problems. (2.) Professor LEFEVRE.

DIVISION OF MATHEMATICAL AND PHYSICAL SCIENCES.**ASTRONOMY.**

Professor SEARES; Mr. HAYNES.

Primarily for Graduates.

8. Theory of Orbits and Special Perturbations.
9. Celestial Mechanics.
10. Research.

For Undergraduates and Graduates.

4. History of Astronomy. Historical development of the science; its spirit; its influence on other sciences. The development of astronomical theories as an exemplification of the methods of science in general. Open to students who have completed Course 1 or Course 11. (3.)

5. Advanced Spherical and Practical Astronomy. Open to students who have completed Course 2 or Course 3. (3.)

6a. Numerical Computation. Methods and precepts for the facilitation of numerical calculations. Development of the principal formulæ of Interpolation and Mechanical Quadratures, with extensive applications to the problems of Astronomy and Geodesy. (2.)

7b. Method of Least Squares, with applications to the problems of Astronomy and Geodesy. (2.)

The Laws Observatory:

The practical work of the Department of Astronomy is carried on with the instruments of the Laws Observatory. The equipment consists of a 7 1-2 inch equatorial refracting telescope by Merz and Sons, of Munich, a 4 1-2 inch equatorial refracting telescope by Gans, a 2 1-10 inch transit instrument by Brunner, of Paris, a 2 1-8 inch altitude and azimuth instrument by E. & G. W. Blunt, of New York, a Pickering stellar photometer, a disc photometer by Bra-shear, a theodolite, sidereal and mean time clocks, sidereal break-circuit chronometer, chronograph, sextants, micrometer, spectro-scope, and outfit of smaller instruments.

The clocks and instruments are mounted on plers of solid masonry, isolated from the floors and walls of the building, and are provided with the usual electrical connections. The dome cov-

ering the 7 1-2 inch telescope is 18 feet in diameter. A cone 14 feet in diameter, shelters the 4 1-2 inch equatorial.

In the year 1880, Dr. S. S. Laws, then President of the University, contributed largely from his private funds toward the improvement of the observatory building and the equipment. In recognition of this generosity the Board of Curators named the observatory in his honor.

The Laws Astronomical Medal:

The "S. S. Laws Astronomical Medal," is offered annually at Commencement to the student who stands highest in Astronomy, and has at the same time attained a high average of general scholarship. An original thesis written on some astronomical subject and showing capacity for scientific investigation is required.

CHEMISTRY.

Professor BROWN; Professor CALVERT; Professor SCHLUNDT; Mr. GIBSON; Mr. MORLAN; Mr. RANDALL; Mr. ESTES; Mr. JONES; Mr. BRAY.

Primarily for Graduates.

26. **Radio-activity.** Lectures, experimental work, and recitations on the radio-active types of matter and atomic disintegration. The work is based on Rutherford's "Radio-activity." This course will be given in alternate years. It will be given in 1909-10.
(3.) Professor SCHLUNDT.

29b. **Chemical Theory.** Lectures and recitations. (3.)

30a. **History of Chemistry.** Lectures and recitations. (3.)

Courses 29b and 30a should be preceded by courses 1 or 2, 11 and 18.

31a and 32b. **Advanced Organic Chemistry.** Lectures on selected topics, supplemented by reading and reports on classical researches. (2) or (3). Professor CALVERT.

35. **Advanced Physical Chemistry.** Lectures on selected topics supplemented by reading and reports on classical researches. A reading knowledge of German and French is very desirable. Prerequisites: Courses 18 and 21. Credit to be arranged. Professor SCHLUNDT.

40. **Mathematical Chemistry.** Lectures on the application of

the operations of the higher mathematics to the study of chemical reactions. (2.) Mr. MORLAN.

50. **Research.** This will consist principally of original work and investigations in (i) Inorganic, (ii) Organic, and (iii) Physical Chemistry, and will be adapted in some measure to individual cases.

For Undergraduates and Graduates.

11. **Organic Chemistry.** Lectures, recitations, and laboratory work. (3.) Professor CALVERT.

12a. **Preparation of Organic Compounds.** Laboratory course; may be taken with 11. (2) or (3). Professor CALVERT.

13b. **Preparation of Organic Compounds and Organic Analysis.** Laboratory course. (3.) Professor CALVERT.

14a or 14b. **Industrial Organic Chemistry.** Starch, glucose, sugar, fats, oils, soaps, dyes, and other industries. Lectures and recitations. (3.) Professor CALVERT.

17. **Quantitative Organic Analysis.** Quantitative analysis of commercial organic products, such as alcohols, aldehydes, organic acids, glycerine, oils and fats, carbohydrates, petroleum products, soaps, etc. (3.) Professor CALVERT.

18. **Physical Chemistry.** Lectures, recitations, and laboratory work. This course should be preceded by courses in General Inorganic Chemistry, and Organic Chemistry, or accompanied by work in Organic Chemistry. A knowledge of elementary differential and integral calculus is desirable. Two lectures per week. Credit, (3), (4) or (5) hours, depending on the amount of laboratory work elected. Professor SCHLUNDT.

19. **Physical Chemistry.** Laboratory work supplementary to course 18. (2.) Professor SCHLUNDT.

20. **Advanced Inorganic Chemistry.** Lectures and recitations. (3.)

21. **Quantitative Chemical Analysis.** The general principles of gravimetric and volumetric analysis. Laboratory work and lectures. (3.) Mr. GIBSON.

22. **Advanced Quantitative Chemical Analysis.** (4.)

23. **Electro-chemistry.** Lectures, recitations, and laboratory work in electro-chemical measurements. Lectures, (two). Credit

(3), (4) or (5) hours, according to the amount of laboratory work elected. Professor SCHLUNDT.

24. **Electro-Chemistry.** Laboratory work supplementary to course 23. (2.) Professor SCHLUNDT.

A meeting is held fortnightly on Friday at 4:30 p. m., at which reports on current literature, abstracts of special lines of research and the results and progress of investigations in the University and the Agricultural Experiment Station are presented for information and discussion.

GEOLOGY AND MINERALOGY.

Professor MARBUT; Dr. EMERSON.

Primarily for Graduates.

Opportunity for doing research work in Geology will be given to any students who are prepared to do it. This work may be pursued along geological or geographic lines and by either experimental or field methods.

For Undergraduates and Graduates.

8. **The Principles of Geography.** A course of lectures and library work on the fundamental principles of geography as taught by Ratzel, Mackinder, and other modern geographers. Courses 2 and 3b are prerequisites. (3.) Dr. EMERSON.

9a or 9b. **Palaeontology.** This course is intended to serve two purposes: (1) to give a general idea of life development as shown by fossils, (2) to show the use of fossils in identifying the main geological formations. It is designed partially as a supplement to the courses in Biology, giving an idea of the progressive development, in time, of organic life. A knowledge of General Biology is a prerequisite. (3.) Dr. EMERSON.

10. **Modern Problems in Structural Geology.** A lecture and library course based on the work of Süess in "Das Antlitz der Erde." (2.) Professor MARBUT.

MATHEMATICS.

Professor HEDRICK; Assistant Professor KELLOGG; Assistant Professor AMES; Assistant Professor WESTFALL; Dr. INGOLD;
Dr. DUNKEL.

It is especially recommended that students intending to specialize in Mathematics should take courses in French and German

in their preliminary work; but an extensive knowledge of the literature of those languages is not necessary.

The courses past course 10 are open only to those who have secured the permission of the instructor in the course, and of the professor in charge. Courses past course 30 are offered for special work by rather advanced students and are given only when specially announced.

Primarily for Graduates.

20a. **Modern Algebra.** Recitations, following Bocher, Higher Algebra. The course includes work on Algebraic Invariants. Alternate years. Offered 1909-10. (3.)

20b. **Infinite Series and Other Infinite Processes.** Introduction to the Theory of Functions of a Real Variable. Lectures. Alternate years. Offered 1909-10. (3.)

21. **Vector Theory and Multiple Algebra.** Lectures, supplemented by reading. Alternate years. Offered 1909-10. (3.)

22a. **Fourier's Series and Allied Series.** Introduction to mathematical physics. Lectures, supplemented by reading. Alternate years. Offered 1909-10. (3.)

22b. **Potential Function.** This course forms a natural continuation of 22a. Lectures, supplemented by reading. Alternate years. Offered 1909-10. (3.)

23. **Theory of Functions of Real Variables.** Higher Analysis, including the most important features of mathematical analysis, in a comprehensive but elementary manner. Lectures, supplemented by reading. Alternate years. Offered 1909-10. (3.)

24. **Theory of Functions of Complex Variables.** A general course, covering the theories of Riemann, Cauchy, and Weierstrass, in their elementary phases. Theory of Functions of a Complex Variable; Elliptic Functions. Alternate years. Given 1908-9. (3.) Professor HEDRICK.

25a or b. **Theory of Differential Equations.** To be preceded by course 12a. Alternate years. Offered 1909-10. (3.)

26a or b. **Theory of Groups, with Applications to Galois' Theory and Lie's Theory.** Lectures. Alternate years. Given 1908-9. (3.) Assistant Professor AMES.

27a or b. Partial Differential Equations of Mathematical Physics and Integral Equations. Naturally follows courses 22a and 22b. Alternate years. Offered 1909-10. (3.) Assistant Professor KELLOGG.

28a or b. Calculus of Variations. Lectures following Bolza's text and other sources. Alternate years. Given 1908-9. (2.) Assistant Professor WESTFALL.

The following courses are also offered occasionally when the needs of the student seem to warrant.

30a or b. Theory of Numbers. The first semester will deal with the Classical Theory, the second with Algebraic Numbers. (3.)

31a or b. Analytical Mechanics. This course is open only to students who have taken courses 12a and b. (3.) Assistant Professor KELLOGG.

32a or b. Projective Geometry. Open only to students who have taken courses 13a and b. Given 1908-9. (3.)

33a or b. Theory of Abstract Groups. (3.)

34a or b. Theory of Special Functions. Second course, to be preceded by course 23 or 24. (3.)

35a or b. Foundations of Geometry and Non-Euclidean Geometry. (3.)

36a or b. Integral Equations. The general theory, following Fredholm, Hilbert, and Schmidt. To be preceded by Course 27. (3.) Given 1908-9. Assistant Professor WESTFALL.

37a or b. Theory of Sound (or Heat). (3.)

38a or b. Differential Geometry. Second Course on Theory of Surfaces. (3.)

39a or b. Theory of Invariants. To be preceded by course 20a. (3.)

50. Research Courses. The professors and instructors will conduct research work in private with students who desire to do advanced work along special lines. These courses may only be undertaken with the very special advice of the professor in charge. Any number of hours sanctioned by the professor in charge may be entered, according to the nature and amount of work undertaken, and the course may be re-elected repeatedly for work in different subjects, or in the same subject in different semesters.

Mathematical Journal Club. The members of the department, and others who desire, will form a club for the examination of current literature and for the discussion of mathematical topics. Meetings will be held and reports made each week on a set day.

Seminars. In each of the courses past 10, a portion of the regular class hours may be replaced by individual work, the results of which may be presented in meetings to be held at stated intervals.

For Undergraduates and Graduates.

10. Second Course in Calculus. This course should be elected by all who have reasonably succeeded in elementary calculus, who desire to continue mathematical work. It will deal with questions necessarily omitted or treated hurriedly in the first course on Calculus. Goursat-Hedrick, *Course in Mathematical Analysis* will be used as a text, with explanatory lectures. (3.) Professor HEDRICK.

11a. Theory of Equations and Determinants. Recitations, supplemented by lectures; texts, Fine, *College Algebra*; Burnside and Panton, *Theory of Equations*. This course includes special work on advanced algebra. To be elected only with or after the elementary calculus, but independently of course 11b. (3.) Dr. DUNKEL.

11b. Advanced Analytic Geometry. Recitations, supplemented by lectures. The applications of the calculus and extensions of the elementary course on analytic geometry, including solid geometry. To be elected only with or after the elementary calculus, but independently of course 11a. (3.) Dr. DUNKEL.

12a. Elements of Differential Equations. Recitations, supplemented by reading. Text: Murray, *Differential Equations*. Open to those who have taken the elementary calculus. (2.) Dr. INGOLD.

12b. Elements of Analytical Mechanics. Recitations, supplemented by reading. Text: Jeans, *Mechanics*. Open to those who have taken the elementary calculus. (3.) Dr. INGOLD.

13a. Elements of Differential Geometry. Lectures. Introduction to the theory of modern differential geometry. Reference books: Joachimstahl; Niewenglowski; Bianchi; Darboux. Naturally follows either course 10 or 11b. Alternate years. Offered 1909-10. (3.)

13b. **Elements of Projective Geometry.** Lectures, supplemented by reading. Reference books: Emch, *Projective Geometry*; Reye, *Geometrie der Lage*; Scott, *Modern Geometry*. Election independent of course 13a. Alternate years. Offered 1909-10. (3.)

14a or b. **Mathematical Laboratory.** A regular class will be conducted (if desired by a sufficient number) in the construction of mathematical models, with explanatory lectures. Hours to be arranged.

15. **History of Mathematics.** This course is to be given in 1909-10. Prerequisite: Calculus. (1.)

16a or b. **The Mathematical Theory of Probability, with Applications to Life Insurance and Statistics.** This course is given if elected by three students. (3.) Given 1908-9. Assistant Professor KELLOGG.

17b. **Elements of the Theory of Numbers.** Given if elected by three students. (3.) Given 1908-9. Assistant Professor KELLOGG.

For other courses on mathematical topics see also the announcements of Physics and of the Department of Engineering.

PHYSICS.

Professor STEWART; Assistant Professor REESE; Dr. RENTSCHLER.

Primarily for Graduates.

Courses 5, 6, 7 and 15 are courses in Mathematical Physics.

5. **Theory of Light.** Based on Drude's Theory of Optics. Special attention is given to the electromagnetic theory. Lectures and recitations. (3.) Professor STEWART.

7. **Theory of Electricity and Magnetism.** Lectures and recitations. (3.) Professor STEWART.

Courses 5 and 7 will not both be given in the same year.

6. **Theory of Heat.** Lectures and recitations. (3.) Assistant Professor REESE.

15. **Dynamics.** Introduction to the fundamental principles of Mathematical Physics. (3.) Assistant Professor REESE.

10. **Seminary.** Critical reading and discussion of current research work in Physics. A colloquium in which all members of the teaching staff of the department, and students of sufficient attainments take part. (1.)

11. **Research Work.** Hours to be arranged. Professor STEWART, and Assistant Professor REESE.

For Undergraduates and Graduates.

Students intending to specialize in Physics should also take Mathematics. Even in the less mathematical courses some knowledge of Calculus is of great advantage.

8. **Electricity and Light.** This course is entirely laboratory work and must be preceded by either course 1 or 3. It offers training in the more exact methods of laboratory measurements. The work is entirely individual so that the time may be spent either on optical or electrical problems. In Light the work is quantitative, consisting of measurements of wave lengths by interference methods, Fresnel mirrors, interferometers, etc.; determinations of refractive indices; study of resolving power of optical instruments and similar problems. In electricity the work is the same as the laboratory work of course 4. (1), (2) or (3). Professor STEWART.

19. **Mechanics and Heat.** A laboratory course similar to 8. (1) or (2). Assistant Professor REESE.

4. **Electrical Measurements.** Lectures and laboratory. (2) or (3). A knowledge of Calculus is required. Professor STEWART; Dr. RENTSCHLER.

12. **Heat and Light.** Open to those who have completed course 1 or its equivalent. This course is recommended to those who either intend to teach in high schools or desire work more general in character and less mathematical than courses 5, 6, 7, and 15. (3.) Assistant Professor REESE.

17b. **Spectroscopy.** A practical course in the use of various forms of spectrosopes and the applications to physical problems. Open to those who have had course 1 or 3. (2.) Assistant Professor REESE.

9. **Advanced Work in General Physics.** This course, largely laboratory work, will be adapted to meet the needs and attainments of individual students. A student may be assigned a definite problem, the literature of which must be studied and the experimental work performed with the care of original research. (2) to (4). Professor STEWART; Assistant Professor REESE.

For further information concerning the graduate work of the College of Arts and Science, address Professor ISIDOR LOEB, Chairman of the Graduate Conference, Columbia, Missouri.

II. TEACHERS COLLEGE.

The regulations concerning the degrees of Master of Arts and Doctor of Philosophy are essentially the same as those laid down by the College of Arts and Science. See pages 24-27.

Further, before being admitted to candidacy for a Graduate Degree from the Teachers College, the student must give evidence of sound general knowledge of the history and theory of education, and must have had considerable experience in teaching.

All graduate students in the Teachers College, whether candidates for a degree or not, must make Education their major subject, but they may elect such related work as may be approved by the Dean.

EDUCATION.

Professor HILL; Professor MERIAM; Assistant Professor COURSAULT;
Assistant Professor CHARTERS; Assistant Professor
ELLIFF.

Primarily for Graduates.

40. **Philosophy of Education.** The purpose of this course is to give insight into the significance of education as a conscious effort towards human evolution by a study of its relation to the life process, and thus, by giving clearer insight into the aims and methods of education, help to make educational practice a rationalized endeavor rather than a mere routine. This course is open only to students who have had training in philosophy. (3.) Assistant Professor COURSAULT.

41. **Seminary in Educational Psychology.** The special problems selected for study will depend upon the interest of those taking the course, the aim being to guide advanced students of Education in constructive work in the theory of education through a detailed study of a few aspects of mental development. The course is open only to students who have had considerable training in both Education and Psychology.

42. **Seminary in the History and Philosophy of Education.** A critical investigation of topics in connection with the thesis work for the graduate degrees. Assistant Professor COURSAULT.

43. Seminary in School Administration. A research course in school organization and administration with special reference to city school systems. The course is open only to teachers of considerable experience in school supervision who are otherwise qualified to undertake research work, and is to be taken in connection with thesis work for the graduate degrees. Professor MERIAM; Assistant Professor ELLIFF.

44. Seminary in Theory of Teaching. A critical investigation of problems in the theory of teaching in connection with thesis work for graduate degrees. Professor MERIAM; Assistant Professor CHARTERS.

For Undergraduates and Graduates.

10a. Educational Psychology. (Advanced Course.) This course aims to give a thorough treatment of a few of the most important phases of mental development, and is adapted both to those who have had an elementary course in this field and to those who have had an extensive course in General Psychology without reference to educational problems. (3.) Professor HILL.

11b. Principles of Education. The purpose of this course is to give insight into the meaning of education and thereby to reveal the fundamental normative principles upon which educational procedure should rest. This course is intended for seniors and graduates. It may be taken for credit in the College of Arts and Science. (3.) Assistant Professor COURSAULT.

12a. Educational Classics. An intensive study of the historical setting and content of a few educational classics which mark prominent movements in the development of educational thought and practice. This course may be taken for credit in the College of Arts and Science. (3.) Assistant Professor COURSAULT.

13b. History of Education in the United States. A research course for advanced students. This course may be taken for credit in the College of Arts and Science. (2.) Assistant Professor COURSAULT.

16b. School Supervision. This course is a study in the principles and practice of supervision in public schools. The selection and arrangement of the course of study, and the means of assisting teachers are the leading problems. Further problems are: School equipment, school hygiene, school government, class-

ification and records. This course is intended primarily for superintendents, principals, and supervisors in Normal Schools. (3.) Professor MERIAM; Assistant Professor ELLIFF.

17a, 17b. **Class Criticism.** This course consists of a discussion of concrete problems, arising in class room work, based on the principles formulated in *The Theory of Teaching*. These problems are studied in the class room while the student is either teaching or observing. This course is required of all students teaching in the High School and is open to other advanced students, especially those who anticipate supervisory work. (1.) Professor MERIAM.

19a, 19b. **Teaching in the Teachers College High School.** Opportunity is given advanced students to study in an experimental way both the content and method in particular subjects. Professor MERIAM and Assistant Professor CHARTERS.

In addition to the above, a number of teachers' courses in Botany, English, German, etc., are offered and may be counted as Education for the degree of Master of Arts.

For a statement of these courses see the announcement of the Teachers College in the General Catalogue.

For further information concerning the graduate work of the Teachers College, address ISIDOR LOEB, Acting Dean, Columbia, Missouri.

III. SCHOOL OF AGRICULTURE.

The College of Agriculture offers the Graduate Degrees of Master of Science in Agriculture and of Doctor of Philosophy.

Graduates of the College of Agriculture or of other colleges of equal standing, may be admitted to candidacy for Graduate Degrees.

Any graduate student in the College of Agriculture, before being admitted to candidacy for a Graduate Degree, must furnish to the Graduate Committee satisfactory evidence of fundamental knowledge of the principles of agriculture. This requirement will be adhered to, whether the student does his major and minor work in technical agricultural subjects or in other subjects offered in the College of Agriculture.

Candidates wishing to register in the College of Agriculture for a Graduate Degree should make their arrangements with the Graduate Committee which is charged with functions relative to the acceptance of candidates and arrangements for graduate work, in consultation with the head professors of those subjects in which the work is chosen.

Candidates for the degree of Master of Science in Agriculture are required to do one year's graduate work at the University. This work must consist of at least 12 hours a week throughout the year, the major courses selected must be graduate in character, and must be approved by the Dean and the Graduate Committee. Not less than one-half of this work must be in a major subject and the remainder in one or two minor subjects.

An acceptable dissertation, embodying the results of research in the major subject, is also required. The completed dissertation must be typewritten and filed with the Graduate Committee at least three weeks before the candidate's graduation.

The conferring of the degree of Doctor of Philosophy is not dependent upon the fulfillment of a definite time requirement. Scholarly attainments are required in the case of candidates for this degree, particularly in power of independent investigation, which must be evinced by the production of a dissertation embodying the results of original research or productive scholarship of a higher order.

However, not less than three years of graduate study, in connection with proper library and laboratory facilities, are required. At least one year, immediately preceding the conferring of the degree, must be spent in resident work at the University of Missouri. The Graduate Committee shall determine, in the case of any candidate, what credit may be given for work done elsewhere. The candidate must give satisfactory evidence of his ability to read German and French.

The candidate is required to select a major subject for his principal work, and not less than one and not more than two minor subjects. No definite regulations are laid down as to the division of time between the major and minor subjects, but in general the candidate will be expected to devote two-thirds of his time to his major subject.

The head professors of the departments in which the candidate chooses his major and minor subjects shall take charge of his examinations and report the results to the Graduate Committee. An oral examination before the Agricultural Faculty may also be required. Upon the satisfactory completion of work for an advanced degree, the candidate may be recommended by the Agricultural Faculty to the Board of Curators for the degree.

COURSES OF INSTRUCTION.

AGRONOMY.

Professor MILLER; Mr. HUGHES; Mr. DEMAREE.

Primarily for Graduates.

1. **Special Investigations.** Original investigations in soils and in crop production. The special work undertaken will be determined by the preparation and needs of the student.

For Undergraduates and Graduates.

2. **Seminary.** Reading and discussion of recent and special investigations in soil fertility and crop production. Original papers on assigned topics will be presented for discussion. Each student will be expected to contribute at least four such papers during the year. A reading knowledge of French and German is recommended.

AGRICULTURAL CHEMISTRY.

Professor TROWBRIDGE; Mr. MOULTON; Mr. FRANCIS; Mr. HAIGH.

Primarily for Graduates.

3. **Research.** This course can be elected either as major or minor for advanced degrees, and may include a thesis showing the results of the investigations. The chemical laboratories offer exceptional facilities for research. Subjects may be selected in (a) animal nutrition, (b) composition of animal fats as affected by feeding, age, breed, etc., (c) the composition of meats, feeding stuffs, fertilizers, soils, etc., (d) the chemical problems involved in the dairy industries, (e) the distribution of phosphorus in the animal organism with special reference to the separation of phosphorus compounds, (f) chemical problems involved in the enforcement of State and National pure food laws, (g) the separation of the proteids of flesh and study of their hydrolytic cleavage products.

4a. **Chemistry of the Proteins.** A critical study of the composition and classification and of the decomposition products of the meat and vegetable proteins. Lectures and recitations three times a week. (3.)

For Undergraduates and Graduates.

2. **Advanced Agricultural Chemistry.** This course is a continuation of the regular undergraduate course in agricultural chemistry, which is required of all undergraduate students in agriculture. A critical study of methods in use in the chemical laboratories of the experiment station will be made, including an examination of foods and feeding stuffs for adulteration, etc. This work is planned primarily for those who wish to fit themselves for the work of experiment station and city food laboratories. Elective, three to five periods per week, including one lecture or recitation each week, hours to be arranged.

ANIMAL HUSBANDRY.

Professor MUMFORD; Mr. TROWBRIDGE; Mr. WILLSON.

Primarily for Graduates.

15. **Animal Breeding.** Research in special subjects bearing on the inheritance and development of characters in the domestic animals. Professor MUMFORD.

16. **Zoometry.** Special investigation of the relations of form and function in the domestic animals. Professor MUMFORD.

17. **Research in Stock Farm Management.** Investigations of the principles governing successful systems of stock farm management. Special studies of highly efficient stock farms. Professor MUMFORD.

For Undergraduates and Graduates.

12. **Seminar.** Special investigation bearing on selected lines in Animal Husbandry. The preparation and presentation of papers for discussion by the class. Twice a week. Elective. Professor MUMFORD.

13. **Experimental Feeding.** Original investigations of important problems in feeding cattle, sheep and swine. This course is intended to give experience in methods of experimental work and to make the student familiar with the most approved methods of investigation. Elective. Professor MUMFORD; Mr. TROWBRIDGE; Mr. WILLSON.

14. **Research in Animal Husbandry.** Advanced studies of special phases of Animal Production. Recommended to students who desire more thorough training in the production of cattle, horses, sheep or swine, or who may wish to make a more careful study of the fundamental principles of Animal Husbandry. Professor MUMFORD; Mr. TROWBRIDGE; Mr. WILLSON.

BOTANY.

Professor GAGER; Assistant Professor REED.

Primarily for Graduates.

12. **Research.** Problems for investigation may be assigned in any of the general lines of work for which the student may be best prepared. *Three or more hours.* Hours to be arranged.

13. **Seminary.** The seminary offers to advanced students an opportunity to become familiar with current work in Botany. Reports on appropriate topics will be required, as well as reports on any research work in progress. *Once a week.*

For Undergraduates and Graduates.

6a. **Mycology.** A course in the morphology and physiology of the fungi. Types of the principal groups are studied in the

laboratory, special attention being given to the parasitic forms. Hours to be arranged.

7b. Advanced Mycology. In this course the fungi are studied more from the pathological standpoint. Infection experiments are made with the parasitic fungi, including the bacteria parasitic on plants; the period of incubation, the manner of infection, the character of the disease, and, to a certain extent, methods of combating the organism causing the disease are considered. This course should be preceded by course 6a. *Three hours.* Hours to be arranged.

8a. Embryology and Cytology. A comparative study of the embryology of representative green plants, cytology and micro-technique. Hours to be arranged.

9a. Advanced Physiology. Lectures and experimental work on absorption, nutrition, and growth, and the effects of external stimuli upon plant functions and structures. Lecture, W., at 10; Laboratory, T., Th., 2-4:30.

10a. The Principles of Evolution as Applied to the Study of Plants. *Once a week.*

11. Special Problems. A preliminary to graduate research, and in exceptional cases, special training in lines not sufficiently emphasized in general courses. Laboratory work and a bi-weekly conference for presentation of reports on work assigned. Adequate fundamental work is essential. *Three or more times a week.* Hours to be arranged.

DAIRY HUSBANDRY.

Professor ECKLES; Assistant Professor SHAW; Mr. REED; Mr. RINKLE.
Primarily for Graduates.

1. Dairy Bacteriology. This will be laboratory investigation of certain problems of bacteriology in relation to Dairying, the object being chiefly to give training in methods of research in this line. The work will be adapted largely to the individual student. Graduate.

2. Seminary. The object of this course is to put the student in touch with the literature of the subject and with the investigations and advancement being made in different parts of the world. Each student presents papers on selected topics for discussion and makes reports on recent investigations and on current literature. *Once a week.*

3. Dairy Research. The work is arranged to suit the needs of the individual student. Opportunity and facilities will be given to study and investigate almost any dairy problem in which the student is interested. This work may be along the line of butter and cheese making; the bacteriology of milk and dairy products; or milk production including selection, feeding and management of dairy cattle.

For Undergraduates and Graduates.

3b. Milk Production. The breeds of dairy cattle; selection, breeding and development of a dairy herd; care and management of dairy cattle; feeding for milk production; production of certified and market milk; milk for butter making and cheese making; utilization of by-products of the dairy.

ENTOMOLOGY.

Professor STEDMAN.

Primarily for Graduates.

4. Graduate Work in Entomology. Laboratory Work. Monographing a group (scientific) monographing a species (scientific and economic). Hours to be arranged. Must be preceded by course 3.

For Undergraduates and Graduates.

3. Advanced Entomology. Lectures and laboratory work. Internal anatomy, histology, physiology, embryology, breeding, life histories, habits, economy, distribution, dimorphism, mimicry, determination of species, classifications, ecology, methods, literature, distribution, legislation. Hours to be arranged.

HORTICULTURE.

Professor WHITTEN; Professor HOWARD; Mr. CHANDLER.

Primarily for Graduates.

10. Special Investigation. This course is intended for graduates and advanced students. Special topics for investigation will be assigned. Hours by appointment. Professor WHITTEN; Professor HOWARD.

For Undergraduates and Graduates.

9. Advanced Pomology. A study of the principal species, types and varieties of cultivated fruits and their related forms, together with a consideration of their variations, modifications, and adapta-

tions under culture. The living plant collection and preserved specimens on the Horticultural Grounds afford material for the work. Hours by appointment. Professor WHITTEN.

6b. **Forest Economics.** History of Forestry. A review of the present status of forestry in the United States and other countries. Relation of forests directly and indirectly, to the public welfare. National policy toward reforestation of waste land. Extent and management of the national forests and forest reserves. Forest administration. Exports and imports of forest products. Statistical studies of timber prices, with influencing factors and causes. Professor HOWARD.

7. **Olericulture.** Exhaustive studies of special groups, species, types and varieties of garden vegetables, together with their cultural requirements and adaptations to special purposes. Hours to be arranged. Professor HOWARD.

VETERINARY MEDICINE.

Professor CONNAWAY; Mr. BACKUS.

Primarily for Graduates.

1. **Experimental Study of the Contagious and Infectious Diseases of farm animals**, such as tuberculosis, glanders, hog cholera, Texas fever, rabies, etc. The students will make inoculations, study and record clinical phenomena, make post mortems, preserve the diseased tissues and study them microscopically. A study of the literature of each disease is also required. Open to graduate veterinarians, who may be interested in inspection and quarantine work; also to Agricultural and Medical students who have completed the required work in Histology, Physiology, Bacteriology, and Pathology offered in the Medical Department.

2. **Experimental Study of Veterinary Remedies.** This course is intended for Veterinary practitioners who desire to make a study of the physiological action of medicines on various farm animals, as well as a study of therapeutic action.

3. **Investigation.** Students who have suitable preparation will have an opportunity to assist in the Experiment Station work.

For further information concerning the graduate work of the School of Agriculture, address the Dean, H. J. WATERS, Columbia, Missouri.

IV. DEPARTMENT OF ENGINEERING.

Admission:

The requirement for admission to candidacy for advanced degrees in Civil Engineering, Electrical Engineering, Mechanical Engineering and Chemical Engineering is the degree of Bachelor of Science in Civil Engineering, Electrical Engineering, Mechanical Engineering or Chemical Engineering respectively, from this University or an equivalent degree. Graduates of other universities are not admitted to graduate work *in absentia*.

Degrees:

Candidates for the degrees of Civil Engineer (C. E.), Electrical Engineer (E. E.), Mechanical Engineer (M. E.), or Chemical Engineer (Ch. E.), must complete satisfactorily one year of graduate work in residence or two years of professional practice and graduate work *in absentia*, the equivalent of twenty-four hours of University credit and present an acceptable thesis.

The thesis subject shall be presented to the Dean of the Department of Engineering on or before December 1, and the thesis itself on or before May 1, of the given year. The graduate work is under the direct charge of the heads of the respective departments.

Fellowships, Fees and Expenses:

For statement in regard to fellowships, see page 22.

For statement in regard to fees and expenses, see page 21.

Buildings:

There are two buildings devoted to instruction in Engineering: The Mechanic Arts Building containing the shops and drawing rooms, and the Engineering Building with lecture rooms, drawing rooms, and engineering laboratories, including apparatus rooms for surveying instruments, a laboratory for testing materials of engineering, a dynamo laboratory, a laboratory for electrical measurements, a laboratory for testing materials used in electrical construction, a steam laboratory, a hydraulic laboratory, and a laboratory for the testing of materials used in Mechanical Engineering.

These laboratories are partially equipped and apparatus is continually being added.

Libraries:

The Department of Engineering has a carefully selected and arranged department library. Students also have access to the general library (see page 23).

COURSES OF INSTRUCTION.**CIVIL ENGINEERING.**

Professor SPALDING; Assistant Professor WILLIAMS; Assistant Professor HYDE; Assistant Professor MILLER;
Assistant Professor RODHOUSE.

For Graduates.

101. **Railway Engineering.** Special advanced course in construction, maintenance and management. Hours to be arranged. Assistant Professor MILLER.

102. **Bridge Engineering.** Problems in theory and design in framed structures. Hours to be arranged. Assistant Professor HYDE.

103. **Sanitary Engineering.** Investigations and special problems in sanitary science. Hours to be arranged. Professor SPALDING.

104. **Hydraulic Engineering.** Problems in hydraulics, irrigation, river and harbor improvements. Hydraulic construction. Hours to be arranged. Assistant Professor RODHOUSE.

105. **Concrete Structures.** Theory of re-enforced concrete. Special laboratory investigations. Hours to be arranged. Professor SPALDING and Assistant Professor HYDE.

106. **Advanced Geodetic Surveying.** Problems relating to geodesy and precise surveying. Assistant Professor WILLIAMS.

ELECTRICAL ENGINEERING.

Professor SHAW; Assistant Professor FLOWERS.

For Graduates.

8. **Design.** Special problems; thorough study and design of a single piece of apparatus, such as an induction motor, direct current generator, or rotary. Hours to be arranged. Assistant Professor FLOWERS.

9. **Telephony and Telegraphy.** Apparatus and systems. Lines: their properties, with special reference to effects of induc-

tance and capacity. Wireless telegraphy. Hours to be arranged. Professor SHAW.

10. **Long Distance Transmission.** A thorough study of details. Hours to be arranged. Assistant Professor FLOWERS.

11. **Electric Railway Engineering.** Street, interurban and high speed electric railroading. Electric railway economics. Hours to be arranged. Professor SHAW.

12. **Storage Battery Engineering.** Hours to be arranged. Assistant Professor FLOWERS.

13. **Electrical Engineering Economics.** Hours to be arranged. Professor SHAW.

14. **Research.** Work and hours to be arranged to suit individuals. Professor SHAW and Assistant Professor FLOWERS.

MECHANICAL ENGINEERING.

Professor HIBBARD; Assistant Professor FESSENDEN; Assistant Professor WESTCOTT; Assistant Professor PHILBRICK;
MR. WHARTON.

For Graduates.

21. **Generation of Power.** Advanced work in the theory and design of steam, gas and oil engines, air compressors and motors, steam turbines and hydraulic motors. Hours to be arranged. Professor HIBBARD.

22. **Transmission of Power.** Study of the methods of the transmission of power, heating, lighting, and the arrangement of shops, plants, industrial institutions and towns. Transportation of materials. Hours to be arranged. Assistant Professor FESSENDEN.

23. **Advanced Laboratory Work.** Determination of physical characteristics of oils, fuels, and metals. Thermodynamics of heat engines. Tests of complete plants. Original investigations. Hours to be arranged. Assistant Professor WESTCOTT.

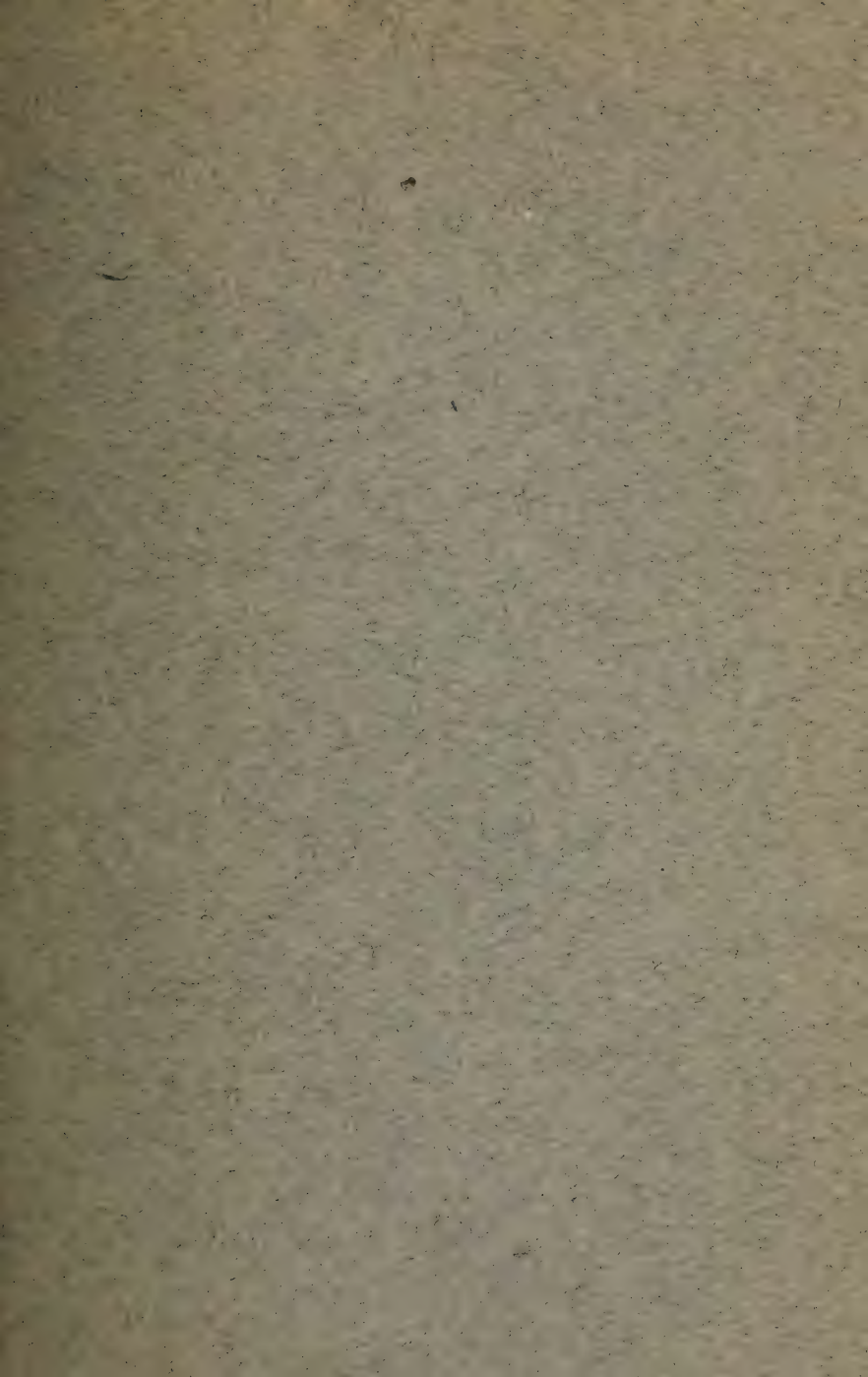
24. **Railway Engineering.** Design, construction and operation of motive power, rolling stock and the auxiliary apparatus employed. Hours to be arranged. Professor HIBBARD.

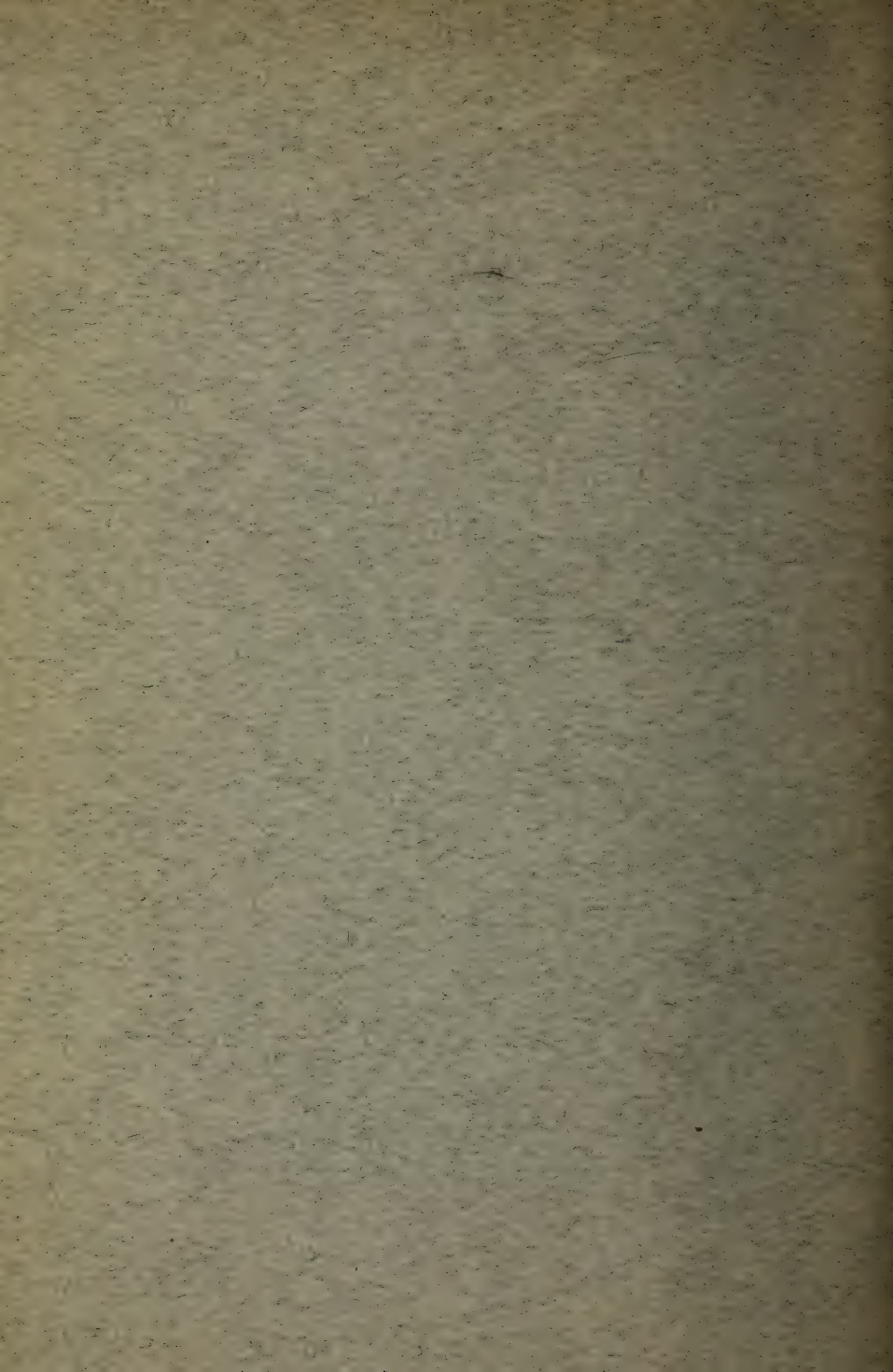
25. **Kinematics and Machine Design.** Advanced work in kinematics and the design of apparatus for specific work. Hours to be arranged. Assistant Professor FESSENDEN.

26. **Refrigeration.** Advanced work in the lay-out and operation of plants for refrigeration. Hours to be arranged. Mr. WHARTON.

27. **Engineering Office Work.** Keeping of costs, estimates, organization of shops, advertising. Hours to be arranged. Professor HIBBARD and Assistant Professor PHILBRICK.

For further information concerning the graduate work of the School of Engineering, address H. B. SHAW, Dean of the Department of Engineering.





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1911/12

THE UNIVERSITY OF MISSOURI BULLETIN

GENERAL SERIES

VOLUME 12 NUMBER 2

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ANNOUNCEMENT
OF THE
GRADUATE SCHOOL
1911-12



UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
February, 1911

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UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
February, 1911

UNIVERSITY CALENDAR AT COLUMBIA.

SUMMER SESSION.

1911—June 9, Friday Registration, Summer Session
June 10, Saturday Organization of Classes
August 9, Wednesday Lectures Close
August 10, Thursday }
August 11, Friday } Examinations

First Semester.

September 18, 19, 20. Entrance Examinations and Registration
September 21, Thursday, at 8 a. m.

Class Work in all Divisions Begins

September 21, Thursday, at 10 a. m. Opening Convocation

November 30, Thursday, Thanksgiving Day Holiday

December 12, Tuesday Semi-Annual Meeting of Curators

December 22, Friday, at 12 m. to } Christmas Holidays

1912—January 3, Wednesday, at 9 a. m. }
January 27, Saturday, to

February 3, Saturday Mid-Year Examinations

Second Semester.

January 31, February 1, 2, Wednesday, Thursday

and Friday Entrance Examinations

February 2, 3, Friday and Saturday

Registration, Second Semester

February 5, Monday, at 8 a. m.

Class Work in All Divisions Begins

February 8, Thursday, at 10 a. m. Opening Convocation

February 22, Thursday, Washington's Birthday Holiday

April 4, Thursday Quarterly Meeting of Curators

April 4, Thursday at 4 p. m. to April 9,

Tuesday at 9 a. m. Easter Holidays

June 1, Saturday to June 8, Saturday .. Final Examinations

June 8, Saturday Stephens Medal Contest

June 9, Sunday Baccalaureate Sermon

June 10, Monday Class Day

June 10, 11, 12, Monday, Tuesday and Wednesday

Entrance Examinations

June 11, Tuesday Class Re-union Day

June 12, Wednesday Alumni Day

June 13, Thursday Annual Meeting of Curators

June 13, Thursday Commencement Day

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THE UNIVERSITY OF MISSOURI.

The University of Missouri was located at Columbia, Missouri, in 1839, and instruction in Academic work was begun in 1841. In the course of its development the institution has found itself called upon to organize several departments of instruction and administration in response to the needs of the several vocations followed by the citizens of the State.

The present organization, with two colleges (Arts and Science, and Agriculture) and schools for professional and graduate work, was adopted May 31, 1909. The separate divisions, each of which was in some form differentiated from the rest of the institution in the year indicated, are as follows:

- I. College of Arts and Science (1839).
- II. School of Education (1867).
- III. College of Agriculture (1870).
- IV. School of Mines and Metallurgy at Rolla (1870).
- V. School of Law (1872).
- VI. School of Medicine (1873).
- VII. School of Engineering (1877).
- VIII. Graduate School (1896).
- IX. School of Journalism (1906).

In addition, special emphasis is given particular lines of work by the establishment and operation of special minor divisions, the chief of which are the Extension Division, the Agricultural Experiment Station, the Engineering Experiment Station, and the Military Department. All of these divisions are located at Columbia with the exception of the School of Mines and Metallurgy, which is situated at Rolla.

Columbia, a town of about 10,000 inhabitants, is situated near the center of the State, half way between St. Louis and Kansas City. It is reached from the east, north, and west by the Wabash Railroad, and connecting lines. The Missouri, Kansas and Texas Railroad affords a direct route to Columbia to persons living on that line, and to those living on the Missouri Pacific, St. Louis and San Francisco, and other southern railroads.

The surrounding region is elevated, well drained and diversified. The University grounds comprise over seven hundred acres of undulating land in the southern part of the town and its out-

skirts. The main divisions of the grounds are the Quadrangle of thirty-two acres, the Horticultural grounds of thirty acres, the Physical Education grounds, and the Experiment Farm of 648 acres.

The University has the following buildings at Columbia: Academic Hall, Laws Observatory, separate buildings for Chemistry, Zoology and Geology; Engineering, and Mechanic Arts; three power-houses; Medical Laboratory Building, Parker Memorial Hospital including the Busch Clinic, and an Animal Building; Agricultural Building, Horticultural Building and Green Houses, Live-Stock Judging, Dairy, Farm Machinery, and Veterinary Buildings, and the Agricultural Farm and Buildings; Switzler Hall (Journalism); the President's House, and the dwelling of the Dean of the College of Agriculture; Benton and Lathrop Halls (dormitories for men), Read Hall (dormitory for women), and the Gymnasium (for men). The women's Gymnasium is housed in Academic Hall, and the practice schools of the School of Education in an old dwelling belonging to the University and in a good building, originally erected for an academy.

THE GRADUATE SCHOOL.

OFFICERS OF INSTRUCTION AND ADMINISTRATION.

PRESIDENT OF THE UNIVERSITY.

ALBERT ROSS HILL, A. B., Ph. D., LL. D.,
President, and Professor of Educational Psychology.

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Assistant Professor of Mathematics.

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GAETANO CAVICCHIA, A. B.,
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WILLIAM THOMAS CROSS, A. B., A. M.,
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OTTO DUNKEL, B. A., A. M., Ph. D.,
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FREDERICK VALENTINE EMERSON, A. B., Ph. D.,
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JAMES ANDREW GIBSON, B. A., M. A.,
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LEONARD HASEMAN, A. B., A. M., Ph. D.,
*Instructor (in charge) of Entomology and Entomologist to the
Experiment Station.*

ELI STUART HAYNES, A. B., A. M.,
Instructor (in charge) of Astronomy.

LOUIS INGOLD, A. B., A. M., Ph. D.,
Instructor in Mathematics.

HORACE FAIRCHILD MAJOR, B. S. A.,
Instructor in Landscape Gardening.

ERNEST EARL MORLAN, A. B., A. M.,
Instructor in Chemistry.

ALBERT TEN EYCK OLMSTEAD, A. B., A. M., Ph. D.,
Instructor in Ancient History.

WILLIAM HENRY PYLE, A. B., Ph. D.,
Instructor in Educational Psychology.

JAMES WALTER RANKIN, A. B., A. M., Ph. D.,
Instructor in English.

HARVEY CLAYTON RENTSCHLER, A. B., A. M., Ph. D.,
Instructor in Physics.

ERNEST HENRY RIEDEL, A. B., A. M., Ph. D.,
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ERNEST VANCOURT VAUGHN, B. L., A. M., Ph. D.,
Instructor in History.

JACOB WARSHAW, A. B., A. M.,
Instructor in Romance Languages.

FRANK ELBERT WHEELOCK, A. B., Ph. D.,
Instructor in Physics.

GENERAL STATEMENT.

Admission:

Graduates of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities, and (in exceptional cases by special permission of the faculty) other persons of liberal education, are admitted to the Graduate School. Admission to this School, however, shall not be understood, as implying admission to candidacy for advanced degrees, which is subject to the regulations indicated below. Students are admitted to the Graduate School by the Dean of the University Faculty to whom applications for admission should be addressed.

Fees and Expenses:

Students are required to pay a library and incidental fee of \$5 a semester or \$10 annually. Those who enter after the first week of either semester must pay an additional fee of \$5 for late registration. Students taking laboratory work must make small laboratory deposits. Non-residents of Missouri are required to pay a tuition fee of \$10 a semester. The estimated cost of room rent and board for students living in Lathrop or Benton Hall, the dormitories for men, varies, according to the room, from \$2.75 to \$3.25 a week. In Read Hall, the dormitory for women, it varies, according to the room, from \$4.75 to \$5.75 a week. The total necessary expenses of a student living in the dormitories for men need not exceed \$150 a year; for women living in Read Hall, they need not exceed \$225. The necessary expenses for students living in private families vary from \$4 to \$6 a week.

University Fellowships and Scholarships:

The University offers annually a number of University Fellowships yielding stipends of \$250, and University Scholarships with stipends of \$150. University Fellows and Scholars are exempt from payment of tuition and of all fees and deposits in the subjects in which they hold fellowships and scholarships. These exemptions increase the value of the fellowships and scholarships by at least \$200 when comparison is made with those in institutions which require the payment of high tuition fees. These fellowships and scholarships will be awarded to the applicants who are best prepared and are of the highest promise in scholarship, irrespective of the lines of work they may desire to pursue. It is expected that fellows and

scholars will be prepared for graduate work in the subjects which they elect, and that they will devote themselves mainly to work in this subject. They will be called upon to render a limited amount of service to the University. University Fellows and Scholars are allowed to engage in outside work only with the consent of the Dean of the Division, and of the Professor of the subject which they elect. The Executive Board, upon the recommendation of such Dean and Professor, may deprive any student of his fellowship or scholarship, whenever it may appear that he is not devoting himself as he should to his work as a fellow or scholar. Applications must be filed not later than April 1, in order to receive consideration in the award for the next Academic year. Applications received after this date and not later than June 1 will be considered in filling any vacancies which may occur in the fellowships or scholarships. Application blanks may be obtained from the Registrar of the University, and when filled out should be sent to the President of the University, Columbia, Missouri.

Curators' Scholarships:

By order of the Board of Curators, the student who attains the highest grade, or who shall be first in merit, in taking a Bachelor's degree, in the graduating class of any of the colleges or universities composing the Missouri College Union, will be admitted to this University for the first year without the payment of any tuition, library, and incidental fee.

Literary and Scientific Societies:

A number of literary and scientific societies are maintained in the University.

The following, conducted by members of the faculties, are open to advanced students: "The Scientific Association," organized with a "General Section" and special Sections of "Biological Science," "Mathematical and Physical Science," and "Social and Political Science," "The Philological Club," "Mathematical Journal Club," and "Zoological Field Club."

The following are conducted by students, in some cases with the participation of members of the faculties: "Athenæan," "Union Literary," "Bliss Lyceum," "Missouri State University Debating Club," "New Era Debating Club," "Medical Society," "Agricultural Society," "Engineering Society," "Der Deutsche Klub," "Sketch Club," "Asterisk Club," "English Club," "History Club," "Social Science Club," "Students' Meeting of the American Institute of Electrical Engineers."

Publications:

The "University of Missouri Studies," the "University of Missouri Bulletin" and the "Publications of the Agricultural Experiment Station" are maintained as a means of publishing the results of original research in the University by instructors and graduate students.

Laboratories and Museums:

Laboratories. Facilities for practical instruction in the sciences are provided in the following laboratories: Agronomy, Animal Husbandry, Anatomy, Astronomy, Bacteriology, Botany, Chemistry (including Agricultural Chemistry and Experiment Station work), Dairy Husbandry, Engineering (Civil, Electrical, Sanitary and Mechanical), Entomology, Experimental Psychology, Geology, and Mineralogy, Horticulture, Mathematics, Pathology, Pharmacology, Phonetics, Physics, Physiology, Physiological Chemistry, Veterinary Science and Zoology.

Museums. There are also museums of Agriculture, Art, Classical Archaeology, Ethnology, Geology and Zoology.

University Libraries:

The University libraries comprise the general library and many departmental libraries. They contain about 115,000 volumes. Students have access also to the library of the State Historical Society of some 25,000 volumes.

The annual catalogue, which contains further information about the University and its several Divisions, may be obtained from the Mailing Clerk, University of Missouri, Columbia, Missouri.

Regulations Governing the Degrees of Master of Arts and Master of Science in Agriculture.

The degrees of Master of Arts and Master of Science in Agriculture are offered to students who have spent at least one year exclusively devoted to advanced courses of study, and who have submitted an acceptable dissertation and passed all prescribed examinations.

A student wishing to make application for either degree must fill out a blank form, provided for the purpose, and must present it to the Chairman of the Graduate Committee on or before October 15.

In order to be accepted as a candidate for the degree, the student must give evidence that he has completed an undergraduate course of study such as is offered by colleges of good standing,

and that he has received a baccalaureate degree equivalent to the baccalaureate degree of the University of Missouri.

In making application the student must indicate the subject of the dissertation and the course of study selected by him on the form referred to above, which must bear the signature of approval of the professor in charge of his major subject, before it is presented to the Graduate Committee for its action. He may, however, defer submitting the subject of the dissertation to the Committee until November 1.

The candidate must choose a major subject, to which he must devote the greater part of his time during the year, and also such other subjects as may be approved. A majority of all work represented in the course of study must be selected from the courses strictly graduate in character.

A dissertation evincing capacity for original research and independent thought in the subject of the major work must be submitted to the Committee for approval on or before May 15. The student should consult the Chairman of the Graduate Committee for information regarding the form in which the dissertation must be presented.

The attention of students is called to the fact that graduate work can not be subjected to rigid regulation, and the Graduate Committee reserves the right to deal with each case on its individual merits.

With the approval of the professors concerned, such candidates as have fulfilled all requirements may, at the close of the year, be recommended by the Graduate Committee for the degree of Master of Arts or Master of Science in Agriculture.

Regulations Governing the Degree of Doctor of Philosophy:

1. *General Statement.*

The degree of Doctor of Philosophy is offered to students who have pursued advanced courses of study, without serious interruption, for a period of at least three years, and who have submitted an acceptable dissertation and passed all prescribed examinations.

In order to be accepted by the Graduate Committee as a candidate for the degree of Doctor of Philosophy, the student must give evidence that he has completed an undergraduate course of study such as is offered by colleges of good standing, and that he has received a baccalaureate degree equivalent to the baccalaureate degree of the University of Missouri.

The Committee reserves the right to decide in each case whether the antecedent training has been satisfactory, and, if any of the years of advanced work have been passed away from this University, whether they may be properly regarded as spent in university studies under suitable guidance and favorable conditions. Private study, or study pursued at a distance from libraries and laboratories, will not be considered as equivalent to university work. In any case the student must spend the year immediately preceding his final examinations in residence at the University of Missouri.

It should be emphasized that the requirements for this degree are not computed in terms of time and courses, but that the degree is conferred only upon such students as have reached, after long study, a high attainment in some special branch of learning and have given the clearest evidence of their ability to carry on independent, original research by reason of having made an actual contribution to knowledge of a character approved by competent judges.

2. *Acceptance of Candidates.*

A student wishing to make application for the degree of Doctor of Philosophy must fill out a blank form, provided for the purpose, secure thereto the signatures of the instructors with whom he desires to take his major and minor subjects and present it to the Graduate Committee for approval on or before October 15. He must also give satisfactory evidence of ability to translate French and German at sight.

3. *Requirements for the Degree.*

(a) *Subjects of Study*—Every candidate for the degree must select one principal or major subject, and at least one and not more than two subordinate or minor subjects, the combination to be approved by the Graduate Committee. The instructor with whom the student is taking his major subject acts as his official adviser and has the general direction of his work.

The student's principal work must be in the major subject. Although no regulations are laid down with respect to the time to be devoted to the major and minor subjects, in general it may be stated that the major subject should represent two-thirds of the student's entire time.

(b) *Dissertation*—The dissertation, embodying the results of original investigation, must be written upon a subject approved by the adviser, and must be submitted to the Committee, legibly written or typewritten, on or before May 1, when it becomes the property of the University. The student should consult the Chairman of the

Committee for information regarding the form in which the dissertation must be presented.

Upon receiving the dissertation a committee is appointed whose duty it is to report upon it in writing to the Graduate Committee.

The candidate is required to print or publish the dissertation, with such revision as the Committee may allow, and he shall present one hundred and fifty copies of the work to the library of the University. The Committee shall take any necessary action to insure the publication of the dissertation within one year after the conferring of the degree. A brief biographical sketch of the writer must be appended to the dissertation.

(c) Examinations—A committee, consisting of the professor of the candidate's major subject and the professors of his minor subjects, is appointed to take charge of all examinations, and to report upon the same to the Graduate Committee in writing.

In addition to final written examinations the candidate may be required to take an oral examination in the presence of the Faculty.

The candidate may, with the approval of the professors in charge, take the examinations in his minor subjects upon the completion of his work in these subjects, but the final examination in the major subject cannot be taken until the dissertation has been approved and accepted.

(d) Conferring of Degree—Upon the satisfactory completion of all requirements, the candidate may be recommended by the Graduate Committee for the degree of Doctor of Philosophy.

COURSES OF INSTRUCTION.

Courses preceded by number with the letter a attached, thus: 4a, 6a, are given the first semester only. Those preceded by a number with the letter b attached, thus: 4b, 6b, are given the second semester only. Those preceded merely by a number are continuous courses and are given both semesters. The number of hours credit given for a course for each semester is indicated by the Arabic numerals following the statement of the course. Courses numbered 200 and above are strictly graduate in character.

DIVISION OF CLASSICAL LANGUAGES.

CLASSICAL ARCHAEOLOGY.

106. **History of Greek Art.** A preliminary study of Assyrian and Egyptian Art, followed by a study of the development of Greek Architecture and Sculpture. Lectures, collateral readings, essays, with constant use of the lantern, photographic reproductions, and models and casts in the Museum of Classical Archaeology. Ancient History is recommended to the students of this course. (3). Mr. PICKARD.

107a. **Mycenaean Art or Art of Primitive Greece.** The earliest discoveries at Mycenae, Tiryns and elsewhere will not be neglected but special attention will be given to the most recent publications on Troy, Crete, and the Argive Heraeum. (1). Mr. PICKARD.

108b. **Introductory Study of Greek Vases and Vase Paintings.** (1). Mr. PICKARD.

While a knowledge of the Greek Language is not an absolute prerequisite for 107a and 108b, these courses are intended for advanced students in Greek.

109. **Etruscan and Graeco-Roman Art.** This course should be preceded by course 106. It will deal with the earliest art of the Italian Peninsula, endeavor to show how this art reached its highest development among the Etruscans, how Etruscan influenced early Roman Art, how later Roman Art grew out of early Roman and late Greek Art modified by the circumstances and character of the Romans. Ancient History is recommended to students in this course. (2). Mr. PICKARD.

110. **Roman Life.** A systematic study of the topography of Roman and of extant remains particularly of Rome and Pompeii. Lectures and readings. Illustrated by the use of plans, maps, and lantern slides. As supplementary to this course, Roman Public and Private Life (Latin 5) is recommended. (2). Mr. PICKARD.

214. **Topography and Monuments of Athens.** Frazer's Pausanias will be taken as the basis of discussion. A reading knowledge of Greek, French and German required. (2). Mr. PICKARD.

215. **Archaeological Seminary.** Hours and work to be arranged. Mr. PICKARD.

Museum of Classical Archaeology:

The museum occupies the third floor of the west wing of Academic Hall. It is supplied with models of temples representing the three orders of Greek Architecture, and with plaster casts of representative specimens of Greek and Roman Sculpture. These are arranged chronologically, and on the walls are hung many framed photographs of other works of classic art. Several original specimens of Egyptian Sculpture have been recently added to the museum. The museum possesses a large number of unframed photographs and an extensive collection of lantern slides.

For courses in the History of Art, see page 63.

GREEK.

113a. **The Greek Theater.** The origin and development of the Greek Theater will be considered, and disputed points in the structure of the theater, and in the presentation of plays will be discussed. The basis of the work will be Doerpfeld and Reisch's *Das Griechische Theater*. (1). Mr. MANLY.

114b. **Aristophanes.** Selected comedies will be read, and the origin and development of comedy will be considered. Attention will also be given to the life of the people as revealed in the plays. (2) or (3). Mr. SCOGGIN.

115a. **General Introduction to the Science of Language.** Lectures, assigned reading, and reports. Among the topics dealt with in the lectures are, the history and methods of the comparative study of language, the relation and distribution of the languages of the earth, the origin of language, analogy, phonetic and semantic

change, international languages, and spelling reform. The student will need Oertel's "Lectures on the Study of Language." The other necessary books are in the library. (3). Mr. SCOGGIN.

216. **Hesiod and Homeric Hymns.** Students should provide themselves with Hesiodi Carmina ed. A. Rzach, Teubner, Leipzig and Hymni Homerici ed. A. Baumeister, Teubner, Leipzig. (3). Mr. MANLY.

217. **Homer.** The whole of the Iliad and Odyssey will be read during the year with especial attention to the antiquities. A special subject will be assigned each student for investigation. Teubner text editions of the poems should be secured in advance. (2) or (3). Mr. MANLY.

218a. **Historical Greek Grammar.** Phonology and Morphology. The lectures will deal systematically with noun and verb inflection within the Greek language itself. The student should procure Brugmann's *Griechische Grammatik* and Solmsen's *Inscriptiones Graecae ad illustrandas dialectos selectae*. (3). Mr. SCOGGIN.

219b. **Historical Latin Grammar.** The sounds and inflections of the Latin language will be set forth briefly in lectures. The student should own Lindsay's *Latin Language* and the same author's *Latin Inscriptions*. (3). Mr. SCOGGIN.

220. **Elementary Sanskrit.** Elements of the language. Translation of Sanskrit into English and English into Sanskrit. Thorough drills in forms. Whitney's *Grammar*, Lanman's *Reader*, and Perry's *Primer*. (3). Mr. SCOGGIN.

LATIN.

106. **Catullus, Martial and the Elegiac Poets.** Must be preceded by courses 1, 3, and 5. (3). Mr. RIEDEL.

109. **Roman Drama (Plautus and Terence).** Must be preceded by courses 1, 3, and 5. (3). Miss JOHNSTON.

110. (a) **Tacitus, Annals:** (b) **Seneca.** Must be preceded by courses 1, 3, and 5. (3). Miss JOHNSTON.

111. **Roman Literature. Characteristic Selections.** Must be preceded by courses 1, 3, and 5. (3). (Not given in 1911-1912). Miss JOHNSTON.

120a. **Introduction to Latin Palaeography.** Includes the reading of facsimiles. (1).

120b. **Introduction to Latin Epigraphy.** Includes a study of representative inscriptions. (1).

215. **Seminary.** Horace, critical and exegetical study of the Odes. (3). Mr. JONES.

217. **Seminary.** Roman Satire from Ennius to Juvenal with lectures on the origin and development of Satire. (3). Miss JOHNSTON.

218. **Plautus.** One hour each week will be given to extensive reading, two hours to the detailed study of some one play. (3). Mr. RIEDEL.

219. **Petronius.** The *Cena Trimalchionis* will be read as a basis for studies in the *sermo plebeius*. (3). Mr. JONES.

221. **Roman Epigram.** Its rise and development as a department of Literature. (2).

222. **Roman Historiography.** Representative selections will be read from all the more important authors and periods. The course will include a study of ultimate and documentary sources, the beginnings of Roman history as a department of literary art, its aims, methods and general character. (3).

224. **Latin Metre.** During the first semester especial attention will be given to the metre of comedy and dactylic hexameter, during the second semester to lyric measures. (1). Miss JOHNSTON.

DIVISION OF MODERN LANGUAGES.

ENGLISH.

104. **The Romantic Movement.** The revolt against classicism in the eighteenth century; the romantic triumph in Scott, Wordsworth, and Coleridge; the radicalism of Byron and Shelley; the neo-classicism of Keats. (3). Mr. TISDEL.

105. **English Literature of the Eighteenth Century.** First Semester: Dryden and Pope. Second Semester: Swift and the Essayists. (3). Mr. BELDEN. (Alternates with 10. Not given 1911-12).

106. **Style and Usage.** An advanced course in the theory and practise of English composition, involving investigation of important questions of usage, structure, and style. (3). Mr. MILLER.

107. **Shakespeare.** Four or five selected plays; class room reading and interpretation. A thesis is required. (3). Mr. FAIRCHILD.

108. **Shakespeare.** The course will be devoted to the history of Shakespeare criticism and to the study of some of the formal elements of the plays (technique, language, versification, etc.). Should be taken in conjunction with or after course 107. (2). Mr. FAIRCHILD.

109. **Tennyson and Browning.** The complete works of Tennyson and most of the poetry of Browning will be studied. (3). (Alternates with 4. Not given 1911-12).

110. **American Literature.** (a) Sectional development; (b) growth of nationality; (c) present tendencies. The leading writers in prose and verse will be considered, first, as to their intrinsic worth; and secondly, as illustrative of national development. (3). Mr. BELDEN.

111. **History of the English Language.** An introductory course in linguistic study, taking first the present facts of the language, its sounds, vocabulary, inflections, and syntax, and second its past development through each period. No previous knowledge of Anglo-Saxon or Middle English is required. (3). Mr. RAMSAY.

112a. **Anglo-Saxon Literature.** An early reading knowledge of Old English will be sought, to be followed by rapid reading of a variety of selected texts, chosen rather to illustrate Anglo-Saxon life and thought than for intensive phonological study. (3). Mr. BELDEN.

113b. **Middle English Literature.** The class will read a large number of selections representative of different aspects of medieval English life and literature from the Norman Conquest to Chaucer. (3). Mr. RANKIN.

114. **Modern Prose Writers.** A study of the works of representative authors, with weekly reports and monthly essays. (3). Mr. MILLER.

127a. **The Argumentative Address.** A study of the principles of argumentation; practise in the drawing of briefs and in the writing of forensics; debating. (3). Mr. TISDEL.

116b. **Debating.** Investigation of special questions; practise in debate. Designed especially for members of the Debating Squad. (3). Mr. TISDEL.

117. **Recent and Current English Literature.** The representative writers and literary movements in England from about 1875 to the present day will be studied, principally by lectures and reports. During the first semester the later Victorian poets, novelists, and essayists will be considered, with special emphasis upon Stevenson, Meredith, Hardy, and Kipling. The second semester will be devoted to a study of the chief movements still in progress, realism and naturalism, symbolism, nationalism, as manifested in contemporary drama, fiction, and poetry. (3). Mr. RAMSAY.

This course is open only to students who have taken 3 and either 104 or 109.

118. **English Versification.** (2). Mr. MILLER.

215. **Beowulf.** The study of the poem will be pursued as an exercise in Old English phonology, in text-criticism, and in the investigation of poetic principles. (3). Mr. BELDEN.

219b. **Popular Ballads.** A study of popular poetry on the basis of Child's *English and Scottish Popular Ballads*, with analysis of the theories of Gummere, Meier, Henderson and others, and illustrations from balladry in Missouri. (2). Mr. BELDEN.

220. **Literary Criticism.** The history of critical theory will first be traced in outline and some of the standard works read. This will be followed by more distinctly constructive work, in which the problems of criticism will be considered and an attempt made to determine grounds of literary judgment. (3). Mr. FAIRCHILD.

222. **The Rise of the Drama.** From the beginning of the modern drama in the liturgical plays of the tenth century, through the English miracles, moralities, and interludes, to the immediate predecessors of Shakespeare. (3). Mr. RAMSAY.

223. **Elizabethan Drama.** History of the earlier Elizabethan Drama; study of the works of Lyly, Kyd, Greene Peele, and Marlowe; the doubtful plays of Shakespeare. (3). Mr. FAIRCHILD. (Alternates with 22. Not given 1911-12)

225. **Seminary.** Subject for 1911-12, Chaucer.

GERMANIC LANGUAGES.

104a and 104b. **Masterpieces in Modern German Drama, Lyrics, and Novel.** Intensive study. from the literary and cultural side, of a number of carefully chosen Modern German dramas, lyric poems, and novels. Parallel reading and reports. (3). Mr. ALMSTEDT.

105a. **Outline Course in German Literature.** The aim of the course is to acquaint the student with the most important works and movements in the evolution of German literary life. (3). Mr. BEK.

106. **Lessing.** Lectures on Lessing's life and works; intensive study of Lessing the dramatist and the critic; essays written in German. Course conducted in German. (6). Miss STEWART.

107. **Schiller.** This course will consist in the study of Schiller's *Jungfrau von Orleans*, *Maria Stuart*, *Braut von Messina*. *Wilhelm Tell*, *Wallenstein*; essay in German, based on the texts; Lectures on Schiller's life and works. Course conducted in German. (6). Mr. HOFFMAN.

108 **Goethe.** Lectures on Goethe's life and works; intensive study of Goethe's prose, poetry, and dramas; essays written in German. Course conducted in German. (6). Mr. ALMSTEDT.

109b. **Outline Course in Historical Grammar.** This course together with 5a is arranged to meet the needs of the prospective teacher of German. Though a knowledge of the older periods is desirable, it is not required. (3). Miss STEWART.

110b. **Deutsche Aufsätze und Stilübungen.** Advanced course in German theme-writing; discussions of grammatical, syntactical, and stylistic points. This course is intended for teachers of German or for students who propose to become teachers of German; conducted in German. (3). Mr. HOFFMAN.

111b. **Middle High German.** (Introductory Course.) For advanced seniors. The class will study *Der arme Heinrich* by Hartmann von Aue. Translation into modern German of mediaeval idiom. (3). Mr. ALMSTEDT.

212. **German Literature of the Second Half of the 19th Century.** This course will consist of lectures and reports. During the first semester Hebbel, Ludwig, Freytag, and Wagner will be especially emphasized. The minor authors will be treated in lectures. The second semester will be devoted to a study of the realistic writers of Germany, especially Hauptmann, Sudermann, Wildenbruch and Fulda. The foreign influence on these writers will be carefully considered. (3). Mr. BEK.

213b. **Romanticism.** This course is intended to comprise an exhaustive study, as far as is possible, of German romanticists and their works; and to show the relation of this movement to similar ones in other literatures. (3). Mr. HOFFMAN.

214a. **The Reformation and Renaissance (1500-1750).** This course is to give the student a clear view of the development and decline of the literary tendencies, forms and ideals of this period, and the influences that help to develop them or to accelerate their decline. (3). Mr. HOFFMAN.

215b. **Middle High German.** Walther Von der Vogelweide. Discipline in Phonology, morphology, syntax; comparison of mediaeval with modern idiom; a study in lyric poetry. (3). Mr. ALMSTEDT.

216b. **History of the Nibelungenlied.** This course is to comprise a study of the various theories as to the origin and authorship of the poem, the controversies in regard to it, and its relation to the Nibelungensaga and other sagas. A reading knowledge of Middle High German is required. (3). Mr. HOFFMAN.

217b. **Old High German.** Phonology and forms; critical reading of Old High German texts. Prerequisite: Course 220a. Texts: Braune, *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*. (3). Mr. ALMSTEDT.

218a. **Old Norse.** Phonology and forms; critical reading of one or more sagas. Prerequisite; Gothic (Course 220a). Texts: Kahle, *Altisländisches Elementarbuch* and Heusler, *Zwei Isländer-Geschichten*. (2). Mr. ALMSTEDT.

219b. **Old Saxon.** Phonology and forms: critical reading of the *Heliand*. A desirable prerequisite: Gothic (course 20a). (2). Mr. ALMSTEDT.

220a. **Gothic.** Phonology, morphology, and syntax; reading from *Ulfilas*; the relationship of Gothic to Indo-European and to later Germanic dialects, general introduction to the study of Germanic Philology. (5). Mr. ALMSTEDT.

221. **Current Publications.** (1). Miss STEWART.

222. **Seminary.** Subject to be determined. For special students only. (2).

Any other courses in Germanic Languages will be arranged if the needs of the students require.

ROMANCE LANGUAGES.

French.

104. **Composition and Conversation.** Translation of standard works of English literature into French; original themes; study of syntax, grammatical problems, style; conversation. Prerequisite, course 103. (2). Mr. NELSON.

106. **French Literature.** A general outline of its various periods. Lectures, reading of selected works from each period, critical works, reports. Prerequisite, course 103. (3). Mr. MURRAY.

107. **The Literature of the Seventeenth Century.** A more detailed study of the literary movements and writers of the classical period; the development and fixation of forms: the drama, etc.; the development of prose. Prerequisite, course 103. Course 106 is also recommended as a preliminary. (3). Mr. WARSHAW.

108. **The Literature of the Eighteenth Century.** Lectures, reading of selected works from the period, the study of critical works, and reports. Prerequisite, course 103. (3). Mr. NELSON.

109a. **The Literature of the Nineteenth Century.** The revolt against classicism, its causes, results, etc.; the Romantic and other movements down to recent times. Lectures, reading, reports. Prerequisite, course 103. (3). Mr. CAVICCHIA.

109b. **The Literature of the Nineteenth Century.** Recent and contemporary writers; present literary tendencies in France. Lectures, reading, reports. Prerequisite, course 103. (3). Mr. CAVICCHIA.

110. **The Language and Literature Down to the Sixteenth Century.** Lectures. Prerequisite, course 106. (1). Mr. MURRAY.

111. **The Literature of the Sixteenth Century.** Lectures, reading, reports. Prerequisite, course 106. (2). Mr. NELSON.

212. **Seminary in French Literature.** Detailed study of some literary movement or representative writer. *Two, three, or four hours credit.* Mr. MURRAY.

214. **General Introduction to Romance Philology.** (2). Mr. MURRAY.

215. **Old French.** Open to those who have had course 214 or its equivalent. (2). Mr. MURRAY.

216. **Seminary in Romance Philology.** Provençal, Old Spanish, Old Italian. (2). Mr. MURRAY, Mr. WARSHAW, Mr. CAVICCHIA.

Italian.

121. **Dante, Petrarch, Boccaccio.** (3). Mr. MURRAY or Mr. CAVICCHIA.

122. **The Literature of the Sixteenth Century.** Tasso, Ariosto, Pulci, Boiardo, etc. (2). Mr. MURRAY or Mr. CAVICCHIA.

Italian Philology. See courses 214 and 216.

Spanish.

132. **General Survey of Spanish Literature**, with special emphasis on the period of Cervantes, Lope de Vega, Calderón. Relation of Spanish literature to other literatures. Among the works read in 1910-11 were: *Don Quixote*, *La Estrella de Sevilla*, *El Principe Constante*, *Don Gil de las Calzas Verdes*, *Lazarillo de Tormes*. (2). Mr. WARSHAW.

Spanish Philology. See courses 214 and 216.

DIVISION OF PHILOSOPHY AND EDUCATION.**EDUCATION.**

110a. **Educational Psychology.** (Advanced Course.) This course aims to give a thorough treatment of a few of the most important phases of mental development, and is adapted both to those who have had an elementary course in this field and to those who have had an extensive course in General Psychology without reference to educational problems. (3). Mr. PYLE.

111b. **Scientific Testing of Methods.** It is the purpose of this course to apply the results of psychological investigations to the problems of the school room, in examining and testing methods of teaching, the classification and grading of pupils, and the treatment of individual types and abnormal and delinquent children. Pre-requisite, 110a or its equivalent. (3). Mr. PYLE.

112a. **The Abnormal Child.** A study of mental deficiencies, abnormalities and delinquencies from the standpoint of genetic psychology. Examination of the causes of these defects, tests for their determination and a study of their proper treatment. (1). Mr. PYLE.

113. **Current Problems.** A study of current problems in education from the point of view of psychology. Informal discussions and reports of periodical literature in educational psychology. The object of this course is to acquaint the student with present-day educational problems and give a basis and perspective for their scientific consideration. (1). Mr. PYLE.

120. **History of Education.** The purpose of this course is to give a better understanding and appreciation of present educational tendencies by tracing historically those educational movements which have been most effective in determining the present educational situation or are typical of prominent aspects of it. (2). Mr. COURSAULT.

121a. **Educational Classics.** An intensive study of the historical setting and content of a few educational classics which mark prominent movements in the development of educational thought and practice. (3). Mr. COURSAULT.

122b. **History of Education in the United States.** A research course for advanced students. (2). Mr. COURSAULT.

130a and 130b. **Theory of Teaching.** A general course which aims to formulate a method of class work, and to illustrate as fully as time will permit its application to subjects in all grades of school work. (3). Mr. CHARTERS.

150a. **School Supervision.** This course is a study in the principles and practice of superintending a system of public schools. Types of practical problems considered are, centralizing tendencies, attendance and withdrawal, government and incentives, classification and promotion, text-books and supplies, records and reports, museums and exhibits. Laboratory work is provided in the University Schools. This course is planned for superintendents, principals and supervisors. Mr. MERIAM.

150b. **Supervision of Instruction.** This course is largely one in class criticism and is intended primarily for supervisors and supervising principals in normal schools and large city systems. It is open also to superintendents. Examination and certification of teachers, principles of observation and criticism, standards of instruction, special means of teacher improvement, helping pupils to study and recite, and tests of efficiency in pupils' work are some of the topics considered. Some study will be made of practices in normal schools and city training schools. Actual supervision in the University High School or in the Elementary School is a part of this course. Mr. MERIAM.

151. **Elementary Education.** In this course a study is made of the function of the elementary school in modern life and the nature of the curriculum needed to meet this aim. Courses of study in typical public schools are examined and a study is made

of methods of teaching the various subjects in such schools. This course includes considerable observational work in the Elementary School. By special arrangement with the instructor, students may take either semester's work independently of the other. (3). Mr. MERIAM.

153s. **County Supervision.** A careful study of the more important problems confronting the county superintendent, such as aim in visiting schools; organization of teachers for Reading Circle work, for corn growing and corn judging, for township meetings; planning for county associations; county graduation; grading rural schools; use of state course of study; methods of alternation; school sanitation and decoration. (3). Mr. EMBERSON.

154s. **Rural Education.** This course will be given to the more important problems which confront the rural teachers, such as organization of the new school, the daily program, the overcrowded course of study, correlation of studies, elementary agriculture, home economics, parental co-operation, and the school as a social center. (3). Mr. EMBERSON.

160a. **School Economy.** A course in effective methods of school management from the standpoint of the teacher in secondary schools. (2). Mr. ALEXANDER.

161a. **School Administration.** A general treatment of all the important administrative problems of principals and superintendents in small city school systems. Practical work will be assigned in the investigation and study of the financial, social and educational problems involved in the administration of the University High School and other educational institutions in Columbia. (3). Mr. ALEXANDER.

162b. **Comparative Study of School Systems.** (Prerequisite, Education 120, and Sociology 1a or their equivalent.) A consideration of the essential features of educational administration in their social setting, of England, Germany, France, and the United States, with particular attention to those phases that are of most practical significance for American educators. (3). Mr. ALEXANDER.

163s. **High School Problems.** The history, curriculum, organization and administration of high schools in the United States. In connection with this course a series of conferences regarding

high school problems in Missouri will be conducted, and these will be open, without credit, to students who are not enrolled in the course. (3). Mr. ELLIFF.

170b. **Principles of Education.** The purpose of this course is to give insight into the meaning of education and thereby to reveal the fundamental principles upon which educational procedure should rest. (3). Mr. COURSAULT.

171b. **Social Aspects of Educational Administration.** (Prerequisite, Education 120 and Sociology 1a, or equivalent.) An application of the principles of sociology to the problems of social welfare as achieved through organized educational activities. A special study of the demands of democratic society in the United States upon the administration of public education. The social significance and administrative methods of those phases of education which have only special application or which are yet tentative in character, such as education of special classes, vocational training, compulsory education, child labor legislation, etc. (2). Mr. ALEXANDER.

180a and 180b. **Teaching in the High and Elementary Schools.** (Conducted by the School of Education.) Opportunity is given to study in an experimental way both the content and method in particular subjects. Mr. MERIAM and Mr. CHARTERS.

210. **Seminary in Educational Psychology.** The special problems selected for study will depend upon the interest of those taking the course, the aim being to guide advanced students of Education in constructive work in the theory of education through a detailed study of a few aspects of mental development. The course is open only to students who have had considerable training in both education and psychology. For thesis work. *Credit to be arranged.* Mr. HILL and Mr. PYLE.

211. **Research Course in Educational Psychology.** Original investigation of problems in mental development or in any field of educational psychology. Open only to students who have had training in both general and educational psychology, including training in psychological method. *Credit to be arranged.* Mr. PYLE.

220. **Seminary in the History of Education.** A critical investigation of topics in connection with the thesis work for the graduate degree. Mr. COURSAULT.

230. Seminary in Theory of Teaching. A critical investigation of problems in the theory of teaching in connection with thesis work for the graduate degree. Mr. MERIAM and Mr. CHARTERS.

231. Advanced Theory of Teaching. An intensive study of some problems in theory of teaching. The problems selected will depend in part upon the interests of the students. Considerable use is made of psychology and history of education, satisfactory work in both being a prerequisite to this course. (3). Mr. CHARTERS.

250. Seminary in School Supervision. An intensive study of problems in school supervision is made in connection with thesis work for the graduate degree. Mr. MERIAM.

251. The Public School Curriculum. This is research work on the course of study for public schools. A close examination will be made of typical curricula in the schools of this country and foreign countries, also those of special schools. Study will be made of the development of the curriculum to meet changing social and industrial conditions in community and national life, and to comply more adequately with the psychological development of the pupil. Mr. MERIAM.

260. Seminary in School Administration. A research course in school organization and administration with special reference to city school systems. The course is open only to teachers of considerable experience in school supervision who are otherwise qualified to undertake research work, and is to be taken in connection with thesis work for the graduate degree. Mr. MERIAM, Mr. ELLIFF and Mr. ALEXANDER.

261. Administration of Public Education in the United States. (Prerequisite, Education 120, 161a, and Sociology 1a or their equivalent.) An intensive study of the problems that confront the administrator in the organization and administration of public school systems in the United States, with special reference to city systems in Missouri. The course will include practice in the interpretation of school statistics, in the organization of systems of records for keeping such statistics and in the effective presentation of school information to the public. Open only to superintendents and principals of considerable administrative experience, who obtain the

consent of the instructor. The special report required in this course may be made the basis of the master's thesis for men specializing in administration. (3). Mr. ALEXANDER.

270. **Seminary in Philosophy of Education.** An intensive study of Philosophy of Education made in connection with thesis work for the graduate degree. Mr. COURSAULT.

271. **Philosophy of Education.** This course begins with a critical study of typical theories of knowledge and leads to a voluntaristic theory, in the interpretation of which a philosophy of education is developed. The fundamental ideas acquired are then used in the interpretation and criticism of a variety of modern contributions to educational literature. (3). Mr. COURSAULT.

In addition to the above, a number of courses in the teaching of Botany, English, German, etc., and in the Administration of School subjects are offered and may be counted as Education for the degree of Master of Arts.

For a statement of these courses, see the announcement of the School of Education in the General Catalogue.

EXPERIMENTAL PSYCHOLOGY.

These courses are open only to students who have had an introductory course in General Psychology.

103a or b. **Differential Psychology.** A study of individual differences in character and intelligence, their causes, and their practical significance in life, particularly in school, in civil service, and in legal practice. (2). Mr. MEYER.

104a or b. **General Esthetics.** An experimental as well as theoretical study of the psychological laws underlying our appreciation of the beautiful, chiefly in the arts of painting, sculpture, and architecture, and also in nature. No familiarity with the technic or history of art is required. The aim of this course is to develop in the student an independent judgment in questions concerning the beautiful. (3). Mr. MEYER.

105a or b. **Theory of Music.** The esthetic laws of music. The psychological differences between primitive and highly developed music, and between European and exotic music. (3). Mr. MEYER.

106a or b. **Advanced Psychology.** Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. (3). Mr. MEYER.

107a or b. **Comparative Psychology.** Mental development. Experiments upon the mental processes of animals. Theories of mental evolution. (2). Mr. MEYER.

108a or b. **Abnormal Psychology.** The abnormalities of mental life resulting from inborn, pathological, or artificial causes (such as idiocy, aphasia, apraxia, somnambulism, hypnosis, etc.) and their educational, medical and forensic significance. (2). Mr. MEYER.

109a or b. **Text-books.** A comparative study of the text-books in psychology issued during the last thirty years. (4). Mr. MEYER.

211a or b. **Psychological Seminary and Advanced Laboratory Work.** Critical reading of recent literature. Discussion of special problems and theories. Research work. Mr. MEYER.

Psychological Laboratory:

The psychological laboratory is well equipped with instruments. It consists of ten rooms, all connected by telephone wires, furnished with gas and electricity and four with water. The rooms are used for the purposes indicated. One office, one lecture room, one work shop, one room for the study of animals, one dark room for optical work, one room for work in odor and taste chiefly, three rooms for work on visual, auditory and other sensations and experiments in general, one dark room used for storage only.

PHILOSOPHY.

103a. **Ethical Theory.** An introductory study of the main problems of ethics and of the chief methods of their solution, with constant reference to the principal historic schools for illustration and interpretation. The following topics will be included: the nature and method of ethics as a philosophical discipline; freedom; the ground of obligation; conscience; egoism and altruism; optimism and pessimism; hedonism; utilitarianism; intuitionism; self-realization. (3). Mr. HUDSON.

104b. **History of Modern Philosophy from the Renaissance to the 19th Century.** Lectures, class-room discussions, required reading, written reports. (3). Mr. ROGERS.

105b. **Contemporary Tendencies in Metaphysics.** A consideration of representative systems, issues, and controversies of the present day, together with their general relations to historic philosophy. Stress will be laid upon the problems and tendencies characteristically modern in their setting, such as those aroused by the development of modern science. Lectures, required reading (including reference to the principal philosophic journals), reports and conferences. Open only to those who have had 104b or its equivalent. (3). Mr. HUDSON.

112b. **American Ideals.** A study of the ethical interpretations of life implied in American social and political institutions. (3). Mr. HUDSON.

113a. **The Philosophy of Herbert Spencer.** A study of Spencer's philosophy, with special reference to the conception of evolution as a fundamental philosophical point of view. Readings, discussions and papers. (3). Mr. ROGERS.

224. **Seminary: Pragmatism.** A study of the recent literature with the purpose of interpreting critically the nature and significance of the pragmatic movement in contemporary thought. (2). Mr. ROGERS.

Graduate students in Philosophy are advised to fix upon one of the three following subjects as the point of principal emphasis in their study: I. Logic and Metaphysics; II. Ethics; III. History of Philosophy. This choice should determine in the main the student's election of courses in other departments. The complementary courses advisable in each case should be determined after consultation with the Professor of Philosophy. In general for those who choose I, some advanced work in Mathematics, in Physics and in Biology is particularly desirable; for those who choose II, work in Economics (especially in the Theory of Value), in Sociology, and in Political Theory; for those who choose III, work in Political History, in the History of Economics, in the History of Political Theories, and in some branch of the History of Literature. These recommendations are, however, to be taken as suggestions rather than as prescriptions

DIVISION OF HISTORY AND POLITICAL SCIENCE.

ECONOMICS.

105a and b. **Money, Credit and Banking.** This course is concerned with the origin and history of Money, and the scientific principles involved in Monetary Theory. The purpose will be to form correct notions regarding the nature and importance of a proper standard of value and system of currency. A study of the principles of Banking and Credit will be illustrated by a comparison of the banking systems and methods of leading nations. (5). Mr. BELL.

106a or b. **Economics of Transportation.** A history of the development of transportation agencies, and a study of the principles of rate-making and rate-regulation. (3). Mr. BELL.

108a or b. **Insurance.** The general principles, the different forms of personal and property insurance and the main problems connected with each. (2). Mr. DAVENPORT.

113a or b. **Public Revenues.** A critical examination of (1) the various theories as to the limits of State activity; (2) Various ethical systems as related to the problem of Justice in Taxation; (3) Proportional vs. Progressive taxation; (4) The later developments in Value Theory as bearing on the more difficult problems of Incidence; (5) The administrative aspects of Income Taxation; (6) Ethical, legal, and constitutional aspects of Franchise and Corporation Taxation; (7) The practicability of a scientific articulation of the various taxes under American conditions. (3) to (5). Mr. DAVENPORT.

117a or b. **Accounting.** Business, corporation and public. (3) to (5). Mr. BELL.

117b. **Advanced Accounting.** An intensive study of cost accounting and auditing. Much practice work will be required and arrangements will be made, when possible, to carry out some audit work in connection with the course. Particularly designed for students, who wish especially technique and practice. Mr. BELL.

118a or b. **Trusts and Combinations.** (3). Mr. BELL.

209a or 209b. **Crises and Depressions.** The object of this course is to make a careful analysis of certain important financial crises in order to determine the nature and causes of such disturbances. Open to students who have had at least two courses out of 105, 109a and 211. (2) to (4). Mr. BELL.

210a or 210b. **Problems of Labor.** A study of the special problems and interests of wage earners, such as the organization and policies of trades-unions, employers' associations, arbitration, profit-sharing, factory acts and other forms of labor legislation. (3) to (5).

211. **Advanced Economic Theory.** An examination of the writings of the most prominent economists from the time of Adam Smith to the present with the purpose of constructing an adequate theory of value. *Credit to be arranged.* Mr. DAVENPORT.

212. **Seminary.** Mr. BELL.

213. **Seminary.** Mr. DAVENPORT.

214. **History of Economics.** A first-hand study of authors and documents, with especial reference to the background of political and industrial conditions and of philosophical thought. (2) to (5). The student is advised to correlate this course with related courses in Philosophy, Political Science, History and Sociology. Mr. VEBLEN.

216a or 216b. **Statistics.** Theory, method and practice. (2) to (3). Mr. BELL.

219. **Economic Factors in Civilization.** An inquiry into the nature and working of the economic forces that have affected the character of institutions, with especial reference to the growth of Western Civilization and to those institutions which are characteristic of the modern culture. The course is designed for students in Economics, History, and Sociology. (2) to (5). Mr. VEBLEN.

232a or 232b. **Socialism.** A consideration of the essential features of the socialistic program from the standpoint of economic and sociological theory. An examination will be made of some of the writings of representatives of different types of socialistic thought. Particular attention will be given to these of Karl Marx and of the leaders of modern French and German Socialism. (2) to (3). Mr. VEBLEN.

HISTORY.

100b. **Recent European History.** The political, social and institutional history of the chief European countries since 1815 will be carefully studied with a view to present conditions. (3). Mr. VAUGHN.

110. **History of the United States.** This is an advanced course for mature students beginning the study of American history in the university. The period since 1763 will be especially emphasized. (3). Mr. VILES.

120. **Modern England and the British Empire.** An advanced English history course emphasizing the growth of democracy and imperialism. (3). Mr. VAUGHN.

130b. **Turkey and the Eastern Question.** The historical background of the present situation in Eastern Europe. (3). Mr. OLMSTEAD.

140b. **American Social History.** A survey of the development of American society with emphasis on the economic and social progress since the Revolution. (3). Mr. STEPHENS.

150a. **European Culture and Civilization.** For 1911-12 this course will consist of a careful study of the Renaissance in its cultural aspects. (3). Mr. TRENHOLME.

160. **Historiography and Historical Method.** A course of training for students intending to do advanced and graduate work in history. (1) or (2). Mr. TRENHOLME assisted by other instructors in history.

170b. **History of Missouri.** The primary aim of this course will be to give an account of the development of Missouri since 1803. (3). Mr. VILES.

180a. **History of Reconstruction.** An advanced American history course dealing with the readjustments after the Civil War, along political, social and economic lines. (2) or (3). Mr. VILES.

190. **Political Thought of the Ancient World.** The theory and practice of politics among the Greeks and Romans. (2) or (3). Mr. OLMSTEAD.

200. **Seminary Course in European Colonization.** A study of important phases of modern colonial development. The topics will be carefully selected in accordance with available reference material. (2) or (3). Mr. VAUGHN.

210. **Seminary Course in Ancient History.** Intended for classical as well as historical students. For 1911-12 the work for the first semester will consist of a somewhat minute study of Herodotus and the Persian Wars, in the second semester Polybius and the relations of Rome and Carthage will be taken up. (2) or (3). Mr. OLMSTEAD.

220. **Seminary Course in American Diplomatic History.** A study of the foreign relations of the United States with especial emphasis on the diplomatic side of our relations with British-America and the Spanish-American nations. (2) or (3). Mr. STEPHENS.

230. **Seminary Course in American Political and Governmental History.** The topic for the first semester of 1911-12 will be the Jacksonian Period. The course will deal with the origins and significance of Jacksonian Democracy with especial attention to the social factors and the political leaders. The development of political parties and ideas will also be studied. The topic for the work of the second semester will be announced later. (2) or (3). Mr. VILES.

240. **Seminary Course in English Constitutional and Legal History.** A thorough study of the origin and development of the English system of government and law. Open to advanced students of history, political science and law. (2) or (3). Mr. TRENHOLME.

250. **Seminary in Historical Research and Thesis Work.** A course giving opportunity for research and thesis work along special lines. Primarily intended for candidates for graduate degrees. The work of the student will be under the direction of the instructor most interested in the field in which the topic of special research lies. (2), (3) or (4).

POLITICAL SCIENCE AND PUBLIC LAW.

103b. **Elements of Jurisprudence.** An introduction to the study of law. This course treats of the nature, sources and classification of law, and includes a consideration of the fundamental concepts of private law. The nature and use of legal authorities will be discussed. (2). Mr. LOEB.

104. Constitutional Law of the United States. Particular attention will be given to the field of individual liberty defined in the Constitution of the United States and interpreted in the decisions of the Supreme Court. (3). Mr. LOEB.

105. Municipal Government. A comparative study of the organization, functions, and administration of cities of Europe and the United States. During the latter part of the course special topics will be taken up in more detail, such as; central control over cities, municipal elections, municipal revenue, the regulation of public utilities, and municipal ownership. (2). Mr. LOEB.

206. Comparative Administrative Law. A study of the general principles of administrative law in the United States, England, France, and Germany. The structure and functions of central and local administration will be studied in detail. The legal relations of administrative officers will be considered with special reference to the United States. (2).

207b. Colonial Government. A study of the present government and administration of the colonies of the United States and of the chief states of Europe. (2).

208a. The Government of Missouri. A study of the constitutional development of the state from the Louisiana Purchase to the present time, followed by a consideration of the organization and functions of the institutions of the central and local governments. (2). Mr. LOEB.

209b. The Law of Taxation. A study of the legal rules regulating taxation in the central and commonwealth governments of the United States. The student is advised to correlate this course with related courses in Economics. (2). Mr. LOEB.

220. Seminary in Administration. A course for the investigation of administrative organization and functions. (2), (3) or (4). Mr. LOEB.

SOCIOLOGY.

110a. Modern Charity. A study of the origin, nature, and treatment of the dependent and defective classes. Among the topics treated are the causes of poverty, the causes of degeneracy, the principles of relief, public outdoor relief, organized charity, almshouse administration, the treatment of the vagrant, the care of

dependent children, the care of the insane, the feeble-minded, the epileptic, the education of the blind and the deaf. Text-book work and reports by the class on special subjects for investigation. (3). Mr. PARMELEE.

111b. **Criminology.** A study of the causes, nature, and treatment of crime; the principles of criminal anthropology, criminal jurisprudence, and penology. Among the topics treated are criminal statistics, the social causes of crime, the relations of criminality to degeneracy, the anthropology and psychology of the criminal, negro criminality, the evolution of the criminal law, the reform of modern criminal procedure, modern prison systems, the county jail, the industrial reformatory, the indeterminate sentence, systems of prison labor, probation and parole, the treatment of the juvenile offender. Lectures and reports by the class on special subjects for investigation. (3). Mr. PARMELEE.

112b. **Preventive Philanthropy.** An intensive study of some specific problems in preventive work, including a study of child problems, playgrounds, child labor, and the juvenile court. (2). Mr. CROSS.

115a. **Rural Sociology.** A study of social conditions in rural life. Among the topics considered will be the statistics and movements of rural population, the physical environment of rural life, isolation and means of communication, rural occupations, co-operative organizations among farmers, the family and woman's position in rural life, the country school, the country church, etc. The movements for the improvement of rural life will be considered. Lectures, assigned reading and papers. (2). Mr. PARMELEE.

116b. **Urban Sociology.** A study of social conditions in urban communities. The origin and growth of cities will be considered. An intensive study will be made of the educational, political, moral, social, aesthetic, and religious forces and institutions in urban life. Municipal reform movements will be considered. Lectures, assigned reading and papers. (2). Mr. PARMELEE.

118b. **Social Aspects of Education.** A study of the bases and aims of education from the standpoint of sociology, and the demands of sociology upon subject-matter and methods in education. (2).

125. **Anthropology and Ethnology.** A study of the evolution of man as an animal, and of the evolution and relations of the

different races of mankind. Among the topics considered will be the origin and evolution of man, the fossil remains of man, the old and new stone ages, the specific unity of mankind, the physical and mental criteria of race, the classification of races, the subdivisions, physical, mental, and cultural characteristics of the Negro race, the Mongolian race, the American race and the Caucasian race. Lectures and assigned readings. (2). Mr. PARMELEE.

220. Advanced Sociology. A critical study of sociological theory. The various conceptions of Sociology, its problems, subject-matter, and relations will be discussed with a view to laying the foundations for constructive sociological theory in modern Biology and Psychology.

In the second semester the theories of Tarde, Le Bon, Baldwin, and other psychological sociologists will be examined, and further constructive work in interpreting social phenomena upon the basis of modern Psychology will be attempted. Lectures, discussions, and theses by the class. (3). Mr. ELLWOOD.

221a. Biological Sociology. A course on the biological basis of sociology. The relation of organic to social evolution will be studied with special attention to heredity, selection, adaptation, and variation. Lectures, assigned reading and discussions. (3). Mr. PARMELEE.

222b. Statistical Sociology. Statistical methods for the investigation of sociological problems will be studied. The principal statistical investigations which have so far been made will be analyzed and one or more problems will be given to each student to furnish practice in quantitative treatment. Lectures, assigned reading and research work. (3). Mr. PARMELEE.

226. Ethnic Psychology. A study of the comparative psychology of races as shown in their customs, institutions, and social organization. (Not given in 1911-12.)

227a. The Negro in America. A study of the social, economic, moral, and educational conditions among the negroes of the United States. The work will consist of lectures, library work, and theses. Students will be admitted only after consultation. (3). (Not given in 1911-12.)

230. History of Social Philosophy. Lectures on the development of social thought from Aristotle to the present. The social

philosophies of Plato, Aristotle, St. Augustine, Thomas Aquinas, Machiavelli, Bodin, Hobbes, Locke, Vico, Montesquieu, Rousseau, Condorcet, and the sociological systems of Comte, Spencer, Shaeffle, Lillienfeldt, Gumpłowicz, Ratzenhofer, and Ward will, among others, be considered. A large amount of assigned reading will be required in this course. The student is advised to correlate this course with related courses in Economics, History, Political Science and Philosophy. (2). Mr. ELLWOOD.

231a. **History of Philanthropy and the Poor Law.** A study of the development of legislation governing, and methods of administering public relief in England and America, and the parallel account of voluntary charitable institutions and methods. (2). Mr. CROSS.

232a or b. **Socialism.** See announcement under Economics.

40. **Seminary.** Research work upon special problems in sociology and philanthropy. Two, three, or four hours' credit will be given according to the amount of work. Mr. ELLWOOD, Mr. PARMELEE, Mr. CROSS.

DIVISION OF MATHEMATICAL AND PHYSICAL SCIENCES.

ASTRONOMY.

104. **History of Astronomy.** Historical development of the science; its spirit; its influence on other sciences. The development of astronomical theories as an exemplification of the methods of science in general. Open to students who have completed Course 1 or Course 11. (3).

105. **Advanced Spherical and Practical Astronomy.** Open to students who have completed Course 2 or Course 3. (3).

106a. **Numerical Computation.** Methods and precepts for the facilitation of numerical calculations. Development of the principal formulæ of Interpolation and Mechanical Quadratures, with extensive applications to the problems of Astronomy and Geodesy. (2).

107b. **Method of Least Squares,** with applications to the problems of Astronomy and Geodesy. (2).

208. **Theory of Orbits and Special Perturbations.**

209. **Celestial Mechanics.**

210. **Research.**

The Laws Observatory:

The practical work of the Department of Astronomy is carried on with the instruments of the Laws Observatory. The equipment consists of a 71-2 inch equatorial refracting telescope by Merz and Sons, of Munich, a 41-2 inch equatorial refracting telescope by Gans, a 21-10 inch transit instrument by Brunner, of Paris, a 21-8 inch altitude and azimuth instrument by E. & G. W. Blunt, of New York, a Pickering stellar photometer, a disc photometer by Bra-shear, a theodolite, sidereal and mean time clocks, sidereal break-circuit chronometer, chronograph, sextants, micrometer, spectro-scope, and outfit of smaller instruments.

The clocks and instruments are mounted on piers of solid masonry, isolated from the floors and walls of the building, and are provided with the usual electrical connections. The dome covering the 71-2 inch telescope is 18 feet in diameter. A cone 14 feet in diameter, shelters the 41-2 inch equatorial.

In the year 1880, Dr. S. S. Laws, then President of the University, contributed largely from his private funds toward the improvement of the observatory building and the equipment. In recognition of this generosity the Board of Curators named the observatory in his honor.

The Laws Astronomical Medal:

The "S. S. Laws Astronomical Medal," is offered annually at Commencement to the student who stands highest in Astronomy, and has at the same time attained a high average of general scholarship. An original thesis written on some astronomical subject and showing capacity for scientific investigation is required.

CHEMISTRY.

111. **Organic Chemistry.** Lectures, recitations, and laboratory work. (3). Mr. CALVERT, Mr. BRISTOW, Mr. BUDD.

112a. **Preparation of Organic Compounds.** A laboratory course in synthetic organic chemistry. May be taken with course 111. (3). Mr. CALVERT.

113b. **Preparation of Organic Compounds and Organic Analysis.** Laboratory Course. (3), (4) or (5), according to the amount of work elected. Mr. CALVERT.

114a or 114b. **Industrial Organic Chemistry.** Starch, glucose, sugar, fats, oils, soaps, dyes, and other industries. Lectures and recitations. (2) or (3). Mr. CALVERT.

115a and 115b. **Industrial Inorganic Chemistry.** Lectures and recitations on the application of Chemistry to the purposes of human life as illustrated in the more important arts and industries having a chemical basis for their principal operations and processes. Fuels, water, acids, fertilizers, cements, glass, pottery, paints, gas, explosives, metals, alloys, etc. Thorp's Outlines of Industrial Chemistry for reference. (3). Additional credits may be obtained in this course by arranging for laboratory work. Mr. BROWN.

117. **Quantitative Organic Analysis.** Quantitative analysis of commercial organic products, such as alcohols, aldehydes, organic acids, glycerine, oils and fats, carbohydrates, petroleum products, soaps, etc. (3). Mr. CALVERT.

118. **Physical Chemistry.** Lectures, recitations, and laboratory work. This course should be preceded by courses in General Inorganic and Organic Chemistry or accompanied by work in Organic Chemistry. A knowledge of elementary, differential and integral calculus is desirable. Lectures. (2); Laboratory; (3), (4) or (5). Mr. SCHLUNDT, Mr. MORLAN.

120. **Chemistry of the Rare Earths.** Lectures, recitations, and laboratory work on the occurrence, distribution, properties, and uses of the rare earths. (3). Mr. BROWN.

121. **Quantitative Chemical Analysis.** The general principles of gravimetric and volumetric analysis. Laboratory work and lectures. (3). Mr. GIBSON.

122. **Advanced Quantitative Chemical Analysis.** (6). Mr. GIBSON.

123. **Electro-chemistry.** Lectures, recitations and laboratory work in electro-chemical measurements. Lectures, (2); Laboratory; (3), (4) or (5). Mr. SCHLUNDT.

126a or 126b. **Radioactivity.** Lectures, recitations, and laboratory work on the radioactive types of matter and atomic disintegration. An introductory course. Prerequisites, undergraduate courses in Physics and General Chemistry. Mr. SCHLUNDT.

230a or 230b. **History of Chemistry.** Lectures and recitations. (3).

Course 230a should be preceded by courses 111 and 118.

231a and 232b. **Advanced Organic Chemistry.** Lectures on selected topics, supplemented by reading and reports on classical researches. (2) or (3). Mr. CALVERT.

235a and 235b. **Advanced Physical Chemistry.** Lectures on selected topics, supplemented by reading and reports on classical researches. A reading knowledge of German and French is very desirable. Prerequisites, courses 118 and 121. Credit to be arranged. Mr. SCHLUNDT.

240. **Mathematical Chemistry.** Lectures on the applications of the operations of the higher mathematics to the study of chemical reactions. (2). Mr. MORLAN.

250. **Research.** Research work is offered in the various lines of Chemistry given in this department. Arrangements for research work should be made by consultation with the professor or instructor whose work is elected.

The University of Missouri Section of the American Chemical Society meets fortnightly for reports on current literature and researches in progress in the University. Students are invited to be present. Fridays at 7:00 p. m.

GEOLOGY AND MINERALOGY.

100a. **Economic Geology.** In this course the origin, mode of occurrence, distribution, uses, methods of obtaining, and conservation of deposits of coal, oil and gas, clays, building stones, cement, gypsum, fertilizers, and minor minerals, are studied. Field trips to mines and quarries near Columbia are made. Students study in laboratory the materials discussed in the class room. Prerequisites, courses 1a or 1b, 5b and elementary chemistry. (3). Mr. ———.

101b. Ore Deposits. In this course deposits of the ores of iron, copper, lead, zinc, gold, silver, nickel, aluminum, and the minor metals are studied with reference to their origin, form, geographic distribution, methods of obtaining, production, uses, and conservation. Students identify and learn to recognize the main ores of each metal. Prerequisites, courses 1a or 1b, 4a and elementary chemistry. (3). Mr. ———.

102b. Advanced Physiography. A lecture, text book and conference course intended for those who wish to pursue advanced work in Physiography and for those who expect to teach the subject in secondary schools. The method will be topical and considerable reading will be required. Prerequisite, course 1a or 1b. (3-5). Mr. EMERSON.

105. Field Course. Offered in the Summer Session. Field for 1911 the Wind River Mountains. *Credit eight hours.* Mr. BRANSON.

103a. Historical Geology. This course considers hypotheses for the origin of the earth, principles of sedimentation, the geographic changes of the North American Continent and causes for geographic changes and the climate of each geologic period. Several field trips are made for the study of the strata in the vicinity of Columbia. Prerequisite, course 1a or 1b. (3). Mr. BRANSON.

104b. Geologic Life Development. This course considers the changes that have taken place in the life of the earth from its first appearance to the present, and the causes for these changes. The life of each period is considered first as a whole and then in its relationships to the life of the preceding and following periods. In the laboratory students examine specimens that illustrate the gradual evolution toward present types. Prerequisites, courses 1a or 1b, 103a, and a course in Zoology. (3). Mr. BRANSON.

200b. Advanced Economic Geology. A consideration of the origin of ore deposits and deposits of nonmetallic minerals from the point of view of pure science. Prerequisites, 4a, 5b, 100a, 101b, chemistry, and physics. (5). Mr. ———

201b. Problem Course in Physiography. Advanced work in field or laboratory problems. Prerequisites, 1a or 1b and 102b. (3-5). Mr. EMBERSON.

202a. Stratigraphic Geology. Lectures, map work, and field work on the Stratigraphy of North America, with a special study of a limited area. Prerequisites 103a and 104b. (5). Mr. BRANSON.

203b. Invertebrate Paleontology. A somewhat detailed study of a few of the main groups of invertebrates with reference to their evolution and distribution previous to the present period. To alternate with course 204b. Prerequisite, 104b. Zoology of invertebrates is a highly desirable prerequisite. (5). Mr. BRANSON.

204b. Vertebrate Paleontology. A study of the evolution and distribution of vertebrate life previous to the present period. Prerequisite, 104b. Comparative Anatomy of Vertebrates is a desirable prerequisite. Not to be given in 1911-12. (5). Mr. BRANSON.

205. Research Work. Offered by members of the department in their respective lines.

MATHEMATICS.

It is especially recommended that students intending to specialize in Mathematics should take courses in French and German in their preliminary work; but an extensive knowledge of the literature of those languages is not necessary.

The courses past course 100 are open only to those who have secured the permission of the instructor in the course and of the professor in charge. Courses past course 250 are offered for special work by rather advanced students and are given only when specially announced.

100. Second Course in Calculus. This course should be elected by all who have reasonably succeeded in elementary calculus, who desire to continue mathematical work. It will deal with questions necessarily omitted or treated hurriedly in the first course on calculus and will cover approximately the ground indicated by Goursat-Hedrick, Course in Mathematical Analysis, including also introductory lectures on sets of points. (3). Mr. WESTFALL.

110a. Theory of Equations and Determinants. Recitations, supplemented by lectures. This course includes special work on advanced algebra. To be elected only with or after the elementary calculus. (3). Mr. DUNKEL.

115b. **Advanced Analytic Geometry.** Recitations, supplemented by lectures. The applications of the calculus and extensions of the elementary course on analytic geometry, including solid geometry. To be elected only with or after the elementary calculus. (3). Mr. DUNKEL.

120a. **Elements of Differential Equations.** Recitations, supplemented by reading. Open to those who have taken the elementary calculus. (2). Mr. INGOLD.

125b. **Applications of Differential Equations.** Recitations, supplemented by reading. Applications of methods of 120a to problems of Mechanics, Physics, etc. Open to those who have taken the elementary calculus. (3). Mr. INGOLD.

130a. **Elements of Differential Geometry.** Lectures. Introduction to the theory of modern differential geometry. Reference books: Joachimstahl; Niewenglowski; Bianchi; Darboux. Naturally follows either course 10 or 115b. Alternate years. (Offered 1911-12.) (3).

135b. **Elements of Projective Geometry.** Lectures, supplemented by reading. Reference books: Emch, *Projective Geometry*; Reye, *Geometrie der Lage*; Scott, *Modern Geometry*. Alternate years. (Offered 1911-12.) (3).

140a or b. **Mathematical Laboratory.** A regular class will be conducted (if desired by a sufficient number) in the construction of mathematical models, with explanatory lectures. Hours to be arranged.

150. **History of Mathematics.** A brief outline, covering both elementary and advanced mathematics. Prerequisite: Calculus. (1). Mr. AMES.

160a or b. **The Mathematical Theory of Probability, with Applications to Life Insurance and Statistics.** This course is given if elected by three students. (3).

190a or b. **Seminars.** In addition to the above courses, special individual reading and problem courses will from time to time be given to students of unusual promise, either in connection with other courses which the student is pursuing in the department, or independently. (*Credit to be arranged.*)

200a. **Modern Algebra.** Recitations, following Bocher, Higher Algebra. The course includes work on Algebraic Invariants. Alternate years. Offered 1911-12. (3).

205b. **Infinite Series and Other Infinite Processes.** Introduction to the Theory of Functions of a Real Variable. Lectures. Alternate years. (Given 1910-11.) (3). Mr. AMES.

210. **Vector Theory and Multiple Algebra.** Lectures, supplemented by reading. Alternate years. (Offered 1911-12.) (3).

220a. **Fourier's Series and Allied Series.** Introduction to mathematical physics. Lectures, supplemented by reading. Alternate years. (Given in 1910-11.) (3). Mr. KELLOGG.

225b. **Potential Function.** This course forms a natural continuation of 220a. Lectures, supplemented by reading. Alternate years. (Given 1910-11.) (3). Mr. KELLOGG.

230. **Theory of Functions of Real Variables.** Higher Analysis, including the most important features of mathematical analysis, in a comprehensive but elementary manner. Lectures, supplemented by reading. Alternate years. (Offered in 1911-12.) (3).

240. **Theory of Functions of Complex Variables.** A general course, covering the theories of Riemann, Cauchy, and Weierstrass, in their elementary phases. Theory of Functions of a Complex Variable; Elliptic Functions. Alternate years. (Given 1910-11.) (3). Mr. HEDRICK.

250a or b. **Theory of Differential Equations.** To be preceded by course 120a. Alternate years. (Given 1911-12.) (3).

260a or b. **Theory of Groups, with Applications to Galois' Theory and Lie's Theory.** Lectures. (3).

Among other courses, the following are offered occasionally, when the needs of the student seem to warrant:

265a or b. **Theory of Numbers.** (3).

270a or b. **Analytical Mechanics.** (3).

275. **Partial Differential Equations of Mathematical Physics.** (3).

280a or b. **Calculus of Variations.** (3).

290. Research Courses. The professors and instructors will conduct research work in private with students who desire to do advanced work along special lines. These courses may only be undertaken with the very special advice of the professor in charge. Any number of hours sanctioned by the professor in charge may be entered, according to the nature and amount of work undertaken, and the course may be re-elected repeatedly for work in different subjects, or in the same subject in different semesters.

Mathematical Journal Club. The members of the department, and others who desire, will form a club for the examination of current literature and for the discussion of mathematical topics. Meetings will be held and reports made each week on a set day. Students enrolled in courses 100-250 are asked to attend.

For other courses on mathematical topics, see, also, the announcements of Physics and of the School of Engineering.

PHYSICS.

Students intending to specialize in Physics should also take Mathematics. Even in the less mathematical courses some knowledge of Calculus is of great advantage.

108. Electricity and Light. This course is entirely laboratory work and must be preceded by either course 1 or 3. It offers training in the more exact methods of laboratory measurements. The work is entirely individual so that the time may be spent either on optical or electrical problems. In Light the work is quantitative, consisting of measurements of wave lengths by interference methods, Fresnel mirrors, interferometers, etc.; determinations of refractive indices; study of resolving power of optical instruments and similar problems. In electricity the work is the same as the laboratory work of course 104a. (1), (2) or (3). Mr. STEWART and Mr. REESE.

106. Mechanics and Heat. A laboratory course similar to 108. (1) or (2). Mr. REESE.

104a. Electrical Measurements. Two lectures and three laboratory periods. In the lectures is given an introduction to the mathematical theory of electricity and electrical measurements. The laboratory work consists of such work as comparisons of resistances by Kelvin double bridge and Carey Foster methods; determination of temperature coefficients; comparison of electromo-

tive forces of cells; various uses of the potentiometer; comparison and absolute measurement of capacities; measurement of the coefficients of self and mutual induction; calibration of ammeters and voltmeters; photometric work with incandescent lamps. (5). Mr. STEWART, Mr. RENTSCHLER, Mr. WHEELOCK.

112a. **Heat.** (3).

112b. **Light.** (3).

These courses are open to those who have completed course 1 or its equivalent. This work is recommended to those who either intend to teach in high schools or desire work more general in character and less mathematical than courses 205, 206, 207 and 215. (3). Mr. REESE.

117b. **Spectroscopy.** A practical course in the use of various forms of spectroscopes and the applications to physical problems. Open to those who have had course 1 or 3. (2). Mr. REESE.

109. **Advanced Work in General Physics.** This course, largely laboratory work, will be adapted to meet the needs and attainments of individual students. A student may be assigned a definite problem, the literature of which must be studied and the experimental work performed with the care of original research. (2) or (4). Mr. STEWART, Mr. REESE.

Courses 205, 206, 207, and 215 are courses in Mathematical Physics.

205. **Theory of Light.** Based on Drude's Theory of Optics. Special attention is given to the electromagnetic theory. Lectures and recitations. (3). Mr. STEWART.

207. **Theory of Electricity and Magnetism.** Lectures and recitations. (3). Mr. STEWART.

Courses 205 and 207 will not both be given in the same year.

206. **Theory of Heat.** Lectures and recitations. (3). Mr. REESE.

215. **Dynamics.** Introduction to the fundamental principles of Mathematical Physics. (3). Mr. REESE.

221b. **Electrical Waves.** Theory and applications (2). Mr. STEWART.

210. **Seminary.** Critical reading and discussion of current research work in Physics. A colloquium in which all members of the teaching staff of the department, and students of sufficient attainments take part. (1).

211. **Research Work.** *Hours to be arranged.* Mr. STEWART, Mr. REESE, Mr. RENTSCHLER.

DIVISION OF BIOLOGICAL SCIENCES.

ANATOMY AND HISTOLOGY.

105b. **Topographic Anatomy.** A study of the topography of the various organs by means of serial sections through the body. Open only to students who have completed the undergraduate courses in Anatomy. Laboratory. (3). Mr. JACKSON.

108. **Human Embryology.** Based upon a study of human and other mammalian embryos, especial attention being paid to organogenesis and histogenesis. The elementary courses in Anatomy, Histology, and Embryology are necessary as preparation for this course. *Hours to be arranged.* Mr. JACKSON.

206. **Advanced Anatomy.** Advanced work in Anatomy or Histology. A seminary (which may be taken separately if desired), is held once a week. *Hours to be arranged.* Mr. JACKSON.

207. **Investigation.** Problems of original research will be assigned in Anatomy or Histology. A reading knowledge of French and German is required. *Hours to be arranged.* Mr. JACKSON.

BOTANY.

100a. **Plant Physiology.** Lectures and laboratory work on the physiology of the common cultivated plants, covering such topics as absorption, transpiration, digestion, translocation, synthesis of carbohydrates and proteins, and respiration. (3). Mr. REED.

101b. **Plant Physiology.** A continuation of the preceding course, taking up a study of growth, reproduction, and the reaction of plants to stimuli as light, gravity, etc. (3). Mr. REED.

102b. Physiology of the Fungi. Lectures and laboratory work on the physiology of the fungi. Special emphasis will be placed on the nutrition of fungi, including methods of isolation and pure culture. Attention is also given to the methods of infection, effect on the host plant, etc., of some of the parasitic forms as rusts, smuts, and mildews. This course should be preceded by 2a. (3). Mr. REED.

104b. Histological Methods. The student will learn the methods used in the preparation and preservation of class material in bulk, and in fixing, sectioning and staining of sections for microscopical study. (2). Mr. DURAND.

105. Comparative Morphology and Embryology. A detailed study of the structure and life history of selected representatives of the great groups of green plants. Special attention will be given to tracing the development and homologies of sterile, sporogenous and reproductive parts such as the formation of spores and gametes fertilization, the development of the embryo, etc. The nuclear changes accompanying fertilization and sporogenesis will be followed. This course may profitably be preceded or accompanied by courses 4b, 5a, 6b, and 104b. Lectures and laboratory. (3). Mr. DURAND.

106a. Principles of Plant Breeding. A discussion of the fundamental principles of plant breeding, including parthenogenesis, hybridization, Mendelian phenomena, etc. Lectures and reports on assigned readings. (2). Mr. REED.

107. Special Problems. Students who have had the general courses in morphology and physiology may take a special problem in some phase of botanical work as preliminary to graduate research. The work will be upon a definite topic and will include a survey of the pertinent literature. (2 or more.) Mr. REED, Mr. DURAND.

200. Seminar. Special subjects of botanical research will be taken up and discussed. For the session of 1911-1912 the subject will be the recent work dealing with the cytology of various fungi. In addition the results of investigation carried out in the department will be presented. A reading knowledge of French and German is essential. (1). Mr. REED.

201. Research. Students who have had adequate preparation will be assigned some special problem for investigation. A reading knowledge of French and German is essential. *Credit and hours to be arranged.* Mr. REED, Mr. DURAND.

PATHOLOGY.

201. **Advanced Pathology.** (Prerequisite, Pathological Bacteriology 102a and Pathology 103b.) Choice may be made of either Medical Bacteriology or Pathological Anatomy. The amount and character of the work will depend upon the needs and qualifications of the student. In connection, opportunity will be afforded for practical experience in the handling of all kinds of morbid material. *Hours to be arranged.* Mr. DOLLEY.

202. **Research.** Opportunity is offered to students sufficiently prepared for original investigation of unsolved problems in the fields of Bacteriology, Pathology and Pathological Physiology. A reading knowledge of German is required and one of French is recommended. A seminary is held once a week. Mr. DOLLEY.

203. **Normal and Abnormal Neuro-cytology.** The application of the general principles and theories of biology to the nerve cell in health and disease. The work will necessarily consist largely of original investigation and will be adjusted to the training of the student. *Hours to be arranged.* Mr. DOLLEY.

PHYSIOLOGY.

102a. **Experimental Physiology.** The physiology and physiological chemistry of the proteins; of muscle, nerve and connective tissues; of blood, secretion, digestion, absorption, intermediary metabolism, and excretions; of nutrition, heat production, and heat regulation. A metabolism experiment with a complete quantitative examination of the urine is required. (4). Mr. GIBSON.

103a. **Experimental Physiology.** The physiology of muscle and nerve, circulation, respiration, nervous system, and sense organs. (6).

The laboratory work of this course is open, for three hours credit, to students who present 101b supported by sufficient collateral work in biological or physical science. (3). Mr. GREENE, Mr. HANSEN.

104b. **Physiological Chemistry.** An advanced course supplementing and extending course 2a. The preparation and chemistry of the proteins; a qualitative and quantitative study of the tissues and secretions, of enzymes, of putrefaction and putrefactive products; analyses of typical foods, and the detection of food pre-

servatives and adulterants. The prosecution of a short investigation and formal report on the same are required. (4). Mr. GIBSON.

105b. **Pharmacology.** This course presents the physiological action of drugs from the experimental point of view. The demonstrations are made on man and the lower animals. (4). Mr. GREENE, Mr. GIBSON.

107a or 107b. **Toxicology.** (2) or (3). Mr. GIBSON.

208. **Journal Club.** (1). Mr. GREENE.

209a. **The Pharmacology of the Circulatory System.** (3). Mr. GREENE.

210. **Advanced Physiology.** Advanced courses in Physiology, Physiological Chemistry and Pharmacology. Individual problems will be assigned to students of sufficient preparation. *Hours to be arranged.* Mr. GREENE, Mr. GIBSON.

211. **Investigation.** Opportunity is offered for research into questions of current physiological interest. Mr. GREENE, Mr. GIBSON.

ZOOLOGY.

100b. **Embryology of Vertebrates.** The course is designed to lay the foundation of vertebrate embryology. Successive stages in the development of the frog, the chick, and the pig are studied from preparations of entire embryos and from serial sections. These observations are used as a basis of comparison for the study of human embryology. (3). Mr. LEFEVRE, Mr. TANNREUTHER.

101b. **Comparative Embryology of Invertebrates.** A comparative study of the development of representative forms from the principal phyla of the invertebrates, including a consideration of general phylogenetic and morphological problems. (3). Mr. CURTIS.

102b. **Cytology.** A study of the cell, with special reference to problems of development and inheritance. Cytological technique. (3). Mr. LEFEVRE.

103a. **Experimental Zoology.** A course in zoology, with special reference to the physiological aspect, and including: influ-

ence of environment on structure and on life-cycles, response to stimuli, and experiments on growth, regeneration, and development. (3). (Not to be given in 1911-12.)

104a. **Experimental Evolution and Heredity.** A course of lectures dealing with the experimental study of evolution and heredity. Emphasis is laid on the phenomena of Mendelian inheritance, the origin of species by mutation, and the influence of the environment upon the race. (2). Mr. LEFEVRE.

200. **Research.** Special investigation of unsolved problems of zoology, in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is essential. *Hours to be arranged in accordance with the requirements of individual students.*

201. **Seminary.** Meetings at which subjects of zoological investigation are reported and discussed by instructors and students. Each student is required to give at least four lectures during the year, and experience is thus gained in presenting, in the form of lectures, the results of reading and research. For the session of 1911-12 the following subjects will receive special attention in the work of the Seminary: the cytology of heredity, and the behavior of organisms. A reading knowledge of French and German is essential. (1).

DIVISION OF AGRICULTURE.

AGRICULTURAL CHEMISTRY.

102. **Advanced Agricultural Chemistry.** This course is a continuation of the regular undergraduate course in agricultural chemistry, which is required of all undergraduate students in agriculture. A critical study of methods in use in the chemical laboratories of the experiment station will be made, including an examination of foods and feeding stuffs for adulteration, etc. This work is planned primarily for those who wish to fit themselves for the work of experiment station and city food laboratories. Elective, three to five periods per week, including one lecture or recitation each week. *Hours to be arranged.* Mr. TROWBRIDGE, Mr. MOULTON and Mr. HAIGH.

201. **Seminar.** (1). Mr. TROWBRIDGE.

202. Research. This course can be elected either as major or minor for advanced degrees, and may include a thesis showing the results of the investigations. The chemical laboratories offer exceptional facilities for research. Subjects may be selected in (a) animal nutrition, (b) composition of animal fats as affected by feeding, age, breed, etc., (c) the composition of meats, feeding stuffs, fertilizers, soils, etc., (d) the chemical problems involved in the dairy industries, (e) the distribution of phosphorus in the animal organism with special reference to the separation of phosphorus compounds, (f) chemical problems involved in the enforcement of State and National pure food laws, (g) the separation of the proteids of flesh and study of their hydrolytic cleavage products. Mr. TROWBRIDGE.

203a. Chemistry of the Proteins. A critical study of the composition and classification and of the decomposition products of the meat and vegetable proteins. Lectures and recitations. (3). Mr. TROWBRIDGE.

AGRONOMY.

102. Seminary. Reading and discussion of recent and special investigations in soil fertility and crop production. Original papers on assigned topics will be presented for discussion. Each student will be expected to contribute at least four such papers during the year. A reading knowledge of French and German is recommended. Mr. MILLER.

201. Special Investigations. Original investigations in soils and in crop production. The special work undertaken will be determined by the preparation and needs of the student. Mr. MILLER.

ANIMAL HUSBANDRY.

112. Seminar. Special investigation bearing on selected lines in Animal Husbandry. The preparation and presentation of papers for discussion by the class. *Twice a week.* Elective. Mr. MUMFORD, Mr. TROWBRIDGE, Mr. ALLISON.

113. Experimental Feeding. Original investigations of important problems in feeding cattle, sheep and swine. This course is intended to give experience in methods of experimental work and to make the student familiar with the most approved methods of investigation. Elective. Mr. TROWBRIDGE, Mr. ALLISON.

114. Research in Animal Husbandry. Advanced studies of special phases of Animal Production. Recommended to students who desire more thorough training in the production of cattle, horses, sheep or swine, or who may wish to make a more careful study of the fundamental principles of Animal Husbandry. Mr. TROWBRIDGE, Mr. ALLISON, Mr. MUMFORD.

215. Animal Breeding. Research in special subjects bearing on the inheritance and development of characters in the domestic animals. Mr. TROWBRIDGE, Mr. ALLISON.

216. Zoometry. Special investigation of the relations of form and function in the domestic animals. Mr. TROWBRIDGE.

217. Research in Stock Farm Management. Investigations of the principles governing successful systems of stock farm management. Special studies of highly efficient stock farms. Mr. TROWBRIDGE, Mr. ALLISON, Mr. MUMFORD.

DAIRY HUSBANDRY.

103b. Milk Production. The breeds of dairy cattle; selection, breeding and development of a dairy herd; care and management of dairy cattle; feeding for milk production; production of certified and market milk; milk for butter-making and cheese-making; utilization of by-products of the dairy. Mr. ECKLES.

201. Research in Dairy Husbandry. A large herd of highly developed dairy cattle representing four breeds make it possible to offer facilities for study and investigation on a variety of subjects pertaining to milk production and the care and management of dairy cattle. Students interested in this line are allowed to carry out certain experiments with the dairy animals and in some cases to assist in lines of investigation under way in the Experiment Station. Mr. ECKLES.

202. Special Investigations is Composition of Milk. An extended series of investigations is under way regarding the factors that influence the composition of normal milk. A certain number of students are allowed to assist in these investigations and to undertake small problems independently. Mr. STEELE.

203. Dairy Bacteriology. This will be laboratory investigation of certain problems of bacteriology in relation to Dairying,

the object being chiefly to give training in methods of research in this line. The work will be adapted largely to the individual student. Mr. ECKLES.

204. **Seminar.** The object of this course is to put the student in touch with the literature of the subject and with the investigations and advancement being made in different parts of the world. Each student presents papers on selected topics for discussion and makes reports on recent investigations and on current literature. Mr. ECKLES, Mr. STEELE.

205. **Dairy Manufactures.** Opportunity and facilities are given to study and investigate problems in butter-making, cheese-making and other lines of Dairy Manufactures. Mr. RINKLE.

ENTOMOLOGY.

100b. **Advanced Economic Entomology and Insectary Methods.** Lectures, laboratory and field work. Open only to students who have taken course 1b or 2a. Credit two hours. *Two afternoons a week by appointment.* Mr. HASEMAN.

101a. **Morphology, Histology and Development of Insects.** Open only to students who have taken courses 1b, 4a, and 5b. Credit two hours. Lectures and demonstrations. Mr. HASEMAN.

200. **Research.** Opportunity is offered for original investigation of Economic, Morphologic, and Systematic problems presented by our local insect fauna. Mr. HASEMAN.

FARM MANAGEMENT.

106. **Investigation of Types of Farming.** Field investigations of the different types of farming occurring in a given region, including a careful and detailed study of farm practices and incomes. Thesis required. Mr. DOANE.

107. **Cost of Production Investigations.** Field investigations of comparative cost of producing farm products by the several methods now practiced on Missouri Farms. Thesis required. *Credit to be arranged.* Mr. JOHNSON.

HORTICULTURE.

111. **Advanced Pomology.** A study of the principal species, types and varieties of cultivated fruits and their related forms, together with a consideration of their variations, modifications and adaptations under culture. The living plant collection and preserved specimens on the Horticultural Grounds afford material for the work. *Hours by appointment.* Mr. WHITTEN.

113. **Olericulture.** Exhaustive studies of special groups, species, types and varieties of garden vegetables, together with their cultural requirements and adaptations to special purposes. Mr. WHITTEN, Mr. HOWARD.

114. **Ornamental Plants.** Lectures, laboratory, and assigned readings on the identification and classification of ornamental plants used in Landscape Gardening. The making of herberia. Prerequisite, Botany 4b; Horticulture 8b. (3). Mr. MAJOR.

115a. **Elementary Landscape Designs.** Draughting room exercises. Prerequisite, Horticulture 8b, 114. (3). Mr. MAJOR.

215. **Special Investigation.** This course is intended for graduates and advanced students. Special topics for investigation will be assigned. *Hours by appointment.* Mr. WHITTEN, Mr. HOWARD, Mr. CHANDLER and Mr. MAJOR.

VETERINARY SCIENCE.

201. **Topographic Veterinary Anatomy.** A study of the topographic anatomy of the horse, ox and pig by means of serial cross-sections of preserved cadavers, supplemented by a study of anatomical surface points on the living subject.

This course is designed to meet the needs of advanced students who intend to specialize in Animal Husbandry along the lines of "Stock Judging" and "Meat Production." Course 1a prerequisite. Mr. CONNAWAY.

202. **Contagious Infectuous and Parasitic Diseases of Farm Animals.** In this course an effort is made to present as many clinical cases as possible, in order that the student may gain a practical knowledge of the clinical features as they are encountered in field experience. Experimental inoculations supplement the clinical study. Autopsies are made and the gross and microscopic lesions studied. The specific causes (bacteria and other micro-parasites

and macro-parasites), where known, are isolated and studied. Such ground relating to this group of diseases as has been well covered in the minor course 3a is not repeated in this course. Text and reference books: Friedberger and Froehner's *Veterinary Pathology*, Vol. II, "Infective Diseases;" Law's *Vet. Med.* Vol. IV; Ostertag and Wilcox's "Meat Inspection;" Neumann's "Parasites and Parasitic Diseases;" Nocard and Loclainche's "Les Maladies Microbiennes des Ani maux;" Kitt's "Bacterien Kunde." Special Bulletins and Veterinary Journals. Lectures, assigned reading, clinics and laboratory work. (3). Mr. CONNAWAY.

203. **Investigation.** Students who have suitable preparator will have an opportunity to assist in the Experiment Station work. Studies on immunity in relation to hog cholera will continue to be the principal line of investigation during the coming session. Mr. CONNAWAY.

THEORY AND PRACTICE OF ART.

105. **Pictorial Composition.** Study and practice in the making of pictures. (2). Mr. ANKENY.

106. **Painting.** Style, theory and methods of various schools and movements. Lectures, study of examples and reading. Experimental practice in painting from still life and life with work in original composition. (3). Mr. ANKENY.

107. **Tone.** An advanced painting course. A close analysis of the composition and relation of tones (value, color quality, intensity), with the equivalents in pigments in interpreting both indoor and outdoor subjects. Two periods a week will be given to work directly under the instructor, in addition to which the student will be expected to paint a great deal alone, bringing in the work for criticism. (3-5). Mr. ANKENY.

208. **Seminary.** A research course in the processes of the Old Masters with the adaptation of their traditions to modern work. Mr. ANKENY.

HISTORY OF ART.

105. **History of Modern Belgian, Modern Dutch and American Painting.** Lectures and collateral reading. Critical study of rep-

representative pictures by means of lantern slides, photographs, and other reproductions. (2). Mr. PICKARD.

111. **History of Renaissance Painting.** *First semester:* Italian Painting. *Second semester:* Painting of the Netherlands and of Germany. This course should be preceded or accompanied by European History (History 1a). With Italian Painting, European Culture and Civilization (History 150a) is also earnestly recommended. (3). Mr. PICKARD.

113. **Masterpieces of Architecture, Sculpture, and Painting of Classical, Renaissance and Modern Times.** Lectures fully illustrated with the stereopticon. This course aims to show the historical development of art by the discussion of some of the finest examples in each of the three divisions mentioned. (1). Mr. PICKARD.

216. **Seminary in the History of Art.** *Hours and work to be assigned.* Mr. PICKARD.

As supplementary to all courses offered in the history of Painting and of Sculpture, the Theory of Representation (Theory and Practice of Art) is recommended.

Renaissance and Modern Painting:

The collections of photographs, lantern slides, and other means of illustrating courses in these subjects have been very largely increased during the past year. For reproducing the color of the originals a *Kromskop* and lantern slides made by the *trichrome* process are used. The picture gallery near the Museum of Classical Archeology is hung with carbon photographs, photogravures, and other reproductions of masterpieces of painting.

For courses in Classical Archaeology and Art see page 19.

For further information concerning the work of the Graduate School, address Chairman of the Graduate Committee, University of Missouri, Columbia, Missouri.

THE
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THE UNIVERSITY OF MISSOURI BULLETIN

GENERAL SERIES

VOLUME 13 NUMBER 3

ANNOUNCEMENT
OF THE
GRADUATE SCHOOL
1912-13



UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
March, 1912

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UNIVERSITY OF MISSOURI
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March, 1912

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ANNOUNCEMENT OF GRADUATE SCHOOL

GENERAL STATEMENT.

Admission:

Graduates of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities, and (in exceptional cases by special permission of the faculty) other persons of liberal education, are admitted to the Graduate School. Admission to this School, however, shall not be understood, as implying admission to candidacy for advanced degrees, which is subject to the regulations indicated below. Students are admitted to the Graduate School by the Dean of the University Faculty to whom applications for admission should be addressed.

Fees and Expenses:

Students are required to pay a library and incidental fee of \$5 a semester or \$10 annually. Those who enter after the first week of the first semester or the second Tuesday of the second semester must pay an additional fee of \$5 for late registration. Students taking laboratory work must make small laboratory deposits. Non-residents of Missouri are required to pay a tuition fee of \$10 a semester. The estimated cost of room rent and board for students living in Lathrop or Benton Hall, the dormitories for men, varies, according to the room, from \$2.75 to \$3.25 a week. In Read Hall, the dormitory for women, it varies, according to the room, from \$5.50 to \$6.00 a week. The total necessary expenses of a student living in the dormitories for men need not exceed \$150 a year; for women living in Read Hall, they need not exceed \$250. The necessary expenses for students living in private families vary from \$4 to \$6 a week.

University Fellowships and Scholarships:

The University offers annually a number of University Fellowships yielding stipends of \$250, and University Scholarships with stipends of \$150. These fellowships and scholarships will be awarded to the applicants who are best prepared and are of the highest promise in scholarship, irrespective of the lines of work they may desire to pursue. It is expected that fellows and

scholars will be prepared for graduate work in the subjects which they elect, and that they will devote themselves mainly to work in these subjects. They will be called upon to render a limited amount of service to the University. University Fellows and Scholars are allowed to engage in outside work only with the consent of the Dean of the Division, and of the Professor of the subject which they elect. The Executive Board, upon the recommendation of such Dean and Professor, may deprive any student of his fellowship or scholarship, whenever it may appear that he is not devoting himself as he should to his work as a fellow or scholar. Applications must be filed not later than April 1, in order to receive consideration in the award for the next Academic year. Applications received after this date and not later than June 1 will be considered in filling any vacancies which may occur in the fellowships or scholarships. Application blanks may be obtained from the Registrar of the University, and when filled out should be sent to the President of the University, Columbia, Missouri.

Agricultural Experiment Station Research Fellowships:

The University offers annually six Research Fellowships in the Agricultural Experiment Station each of the value of \$250. It is the purpose of these fellowships to foster and encourage original investigation and to give opportunity to students who desire to become efficient investigators in the field of agricultural science. All candidates for these fellowships must fulfill the requirements for admission to the Graduate School of this University. (See page 3).

These fellowships are available in the departments of Agricultural Chemistry, Agronomy, Animal Husbandry, Dairy Husbandry, Horticulture, Botany, and Entomology. They will be awarded to the candidates who are best prepared and are of the highest promise in scholarship. Application blanks for these fellowships may be obtained from the Director of the Agricultural Experiment Station, Columbia, Mo. Applications must be filed not later than April 1, in order to receive consideration in the award for the next academic year. Applications received after this date will be considered in filling any vacancies which may occur in these fellowships.

Curators' Scholarships:

By order of the Board of Curators, the student who attains the highest grade, or who shall be first in merit, in taking a Bachelor's

degree, in the graduating class of any of the colleges or universities composing the Missouri College Union, will be admitted to this University for the first year without the payment of any tuition, library, and incidental fee.

Literary and Scientific Societies:

A number of literary and scientific societies are maintained in the University.

The following, conducted by members of the faculties, are open to advanced students: "The Scientific Association," organized with a "General Section" and Special Sections of "Biological Science," "Mathematical and Physical Science," and "Social and Political Science," "The Philological Club," "Mathematical Journal Club," "Zoological Field Club," and "The University of Missouri Section of the American Chemical Society."

The following are conducted by students, in some cases with the participation of members of the faculties: "Athenaeum," "Union Literary," "Bliss Lyceum," "Missouri State University Debating Club," "New Era Debating Club," "Medical Society," "Agricultural Society," "Engineering Society," "Der Deutsche Klub," "French Club," "Sketch Club," "Asterisk Club," "History Club," "Branch of the American Institute of Electrical Engineers," "Branch of the American Society of Mechanical Engineers," "Physics Club," "Forestry Club," "Quadrangle Club," and "University Players."

Publications:

The "University of Missouri Studies," several series in the "University of Missouri Bulletin" and the "Publications of the Agricultural Experiment Station" are maintained as a means of publishing the results of original research in the University by instructors and graduate students.

Laboratories and Museums:

Laboratories. Facilities for practical instruction in the sciences are provided in the following laboratories: Agronomy, Animal Husbandry, Anatomy, Astronomy, Bacteriology, Botany, Chemistry (including Agricultural Chemistry and Experiment Station work), Dairy Husbandry, Engineering (Civil, Electrical, Sanitary and Mechanical), Entomology, Experimental Psychology, Educational Psychology, Geology and Mineralogy, Horticulture, Pathology, Pharmacology, Physics, Physiology, Physiological Chemistry, Veterinary Science and Zoology.

Museums. There are also museums of Agriculture, Art, Classical Archaeology, Ethnology, Forestry, Geology and Zoology.

University Libraries:

The University libraries comprise the general library and many departmental libraries. They contain about 142,000 volumes. Students have access also to the library of the State Historical Society of some 55,000 volumes and pamphlets.

Regulations Governing the Degree of Master of Arts:

The degree of Master of Arts is offered to students who have spent at least one year exclusively devoted to advanced courses of study, and who have submitted an acceptable dissertation and passed all prescribed examinations.

A student wishing to make application for this degree must fill out a blank form, provided for the purpose, and must present it to the Chairman of the Graduate Committee on or before October 15.

In order to be accepted as a candidate for the degree, the student must give evidence that he has completed an undergraduate course of study such as is offered by colleges of good standing, and that he has received a baccalaureate degree equivalent to the baccalaureate degree of the University of Missouri.

In making application the student must indicate the subject of the dissertation and the course of study selected by him on the form referred to above, which must bear the signature of approval of the professor in charge of his major subject, before it is presented to the Graduate Committee for its action. He may, however, defer submitting the subject of the dissertation to the Committee until November 1.

The candidate must choose a major subject, to which he must devote the greater part of his time during the year, and also such other subjects as may be approved. A majority of all work represented in the course of study must be selected from the courses strictly graduate in character.

A dissertation evincing capacity for original research and independent thought in the subject of the major work must be submitted to the Committee for approval on or before May 15. The student should consult the Chairman of the Graduate Committee for information regarding the form in which the dissertation must be presented.

The attention of students is called to the fact that graduate work can not be subjected to rigid regulation, and the Graduate Committee reserves the right to deal with each case on its individual merits.

With the approval of the professors concerned, such candi-

dates as have fulfilled all requirements may, at the close of the year, be recommended by the Graduate Committee for the degree of Master of Arts.

Regulations Governing the Degree of Doctor of Philosophy:

1. General Statement.

The degree of Doctor of Philosophy is offered to students who have pursued advanced courses of study, without serious interruption, for a period of at least three years, and who have submitted an acceptable dissertation and passed all prescribed examinations.

In order to be accepted by the Graduate Committee as a candidate for the degree of Doctor of Philosophy, the student must give evidence that he has completed an undergraduate course of study such as is offered by colleges of good standing, and that he has received a baccalaureate degree equivalent to the baccalaureate degree of the University of Missouri.

The Committee reserves the right to decide in each case whether the antecedent training has been satisfactory, and, if any of the years of advanced work has been passed away from this University, whether they may be properly regarded as spent in university studies under suitable guidance and favorable conditions. Private study, or study pursued at a distance from libraries and laboratories, will not be considered as equivalent to university work. In any case the student must spend the year immediately preceding his final examinations in residence at the University of Missouri.

It should be emphasized that the requirements for this degree are not computed in terms of time and courses, but that the degree is conferred only upon such students as have reached, after long study, a high attainment in some special branch of learning and have given the clearest evidence of their ability to carry on independent, original research by reason of having made an actual contribution to knowledge of a character approved by competent judges.

2. Acceptance of Candidates.

A student wishing to make application for the degree of Doctor of Philosophy must fill out a blank form, provided for the purpose, secure thereto the signatures of the instructors with whom he desires to take his major and minor subjects and present it to the Graduate Committee for approval on or before October 15. He must also give satisfactory evidence of ability to translate French and German at sight.

3. Requirements for the Degree.

(a) **Subjects of Study**—Every candidate for the degree must select one principal or major subject, and at least one and not more than two subordinate or minor subjects, the combination to be approved by the Graduate Committee. The instructor with whom the student is taking his major subject acts as his official adviser and has the general direction of his work.

The student's principal work must be in the major subject. Although no regulations are laid down with respect to the time to be devoted to the major and minor subjects, in general it may be stated that the major subject should represent two-thirds of the student's entire time.

(b) **Dissertation**—The dissertation, embodying the results of original investigation, must be written upon a subject approved by the adviser, and must be submitted to the Committee, legibly written or typewritten, on or before May 1, when it becomes the property of the University. The student should consult the Chairman of the Committee for information regarding the form in which the dissertation must be presented.

Upon receiving the dissertation a committee is appointed whose duty it is to report upon it in writing to the Graduate Committee.

The candidate is required to print or publish the dissertation, with such revision as the Committee may allow, and he shall present one hundred and fifty copies of the work to the library of the University. The Committee shall take any necessary action to insure the publication of the dissertation within one year after the conferring of the degree. A brief biographical sketch of the writer must be appended to the dissertation.

(c) **Examinations**—A committee, consisting of the professor of the candidate's major subject and the professors of his minor subjects, is appointed to take charge of all examinations, and to report upon the same to the Graduate Committee in writing.

In addition to final written examinations the candidate may be required to take an oral examination in the presence of the Faculty.

The candidate may, with the approval of the professors in charge, take the examinations in his minor subjects upon the completion of his work in these subjects, but the final examination in the major subject cannot be taken until the dissertation has been approved and accepted.

(d) **Conferring of Degree**—Upon the satisfactory completion of all requirements, the candidate may be recommended by the Graduate Committee for the degree of Doctor of Philosophy.

COURSES OF INSTRUCTION.

Courses preceded by a number with the letter a attached, thus: 104a, 106a, are given the first semester only. Those preceded by a number with the letter b attached, thus: 104b, 106b, are given the second semester only. Those preceded merely by a number are continuous courses and are given both semesters. The number of hours credit given for a course for each semester is indicated by the Arabic numerals following the statement of the course. Courses numbered 200 and above are strictly graduate in character.

GROUP OF CLASSICAL LANGUAGES.

CLASSICAL ARCHAEOLOGY.

106. **History of Greek Art.**—A preliminary study of Assyrian and Egyptian Art, followed by a study of the development of Greek Architecture and Sculpture. Lectures, collateral reading, essays, with constant use of the lantern, photographic reproductions, and models and casts in the Museum of Classical Archaeology. Ancient History is recommended to the students of this course. (3). Mr. Pickard.

107a. **Mycenaean Art or Art of Primitive Greece.**—The earliest discoveries at Mycenae, Tiryns and elsewhere will not be neglected but special attention will be given to the most recent publications on Troy, Crete, and the Argive Heraeum. (1). Mr. Pickard.

108b. **Introductory Study of Greek Vases and Vase Paintings.**—(1). Mr. Pickard.

While a knowledge of the Greek Language is not an absolute prerequisite for 107a and 108b, these courses are intended for advanced students in Greek.

109. **Etruscan and Graeco-Roman Art.**—This course should be preceded by course 106. It will deal with the earliest art of the Italian Peninsula, endeavor to show how this art reached its highest development among the Etruscans, how Etruscan influenced early Roman Art, how later Roman Art grew out of early Roman and late Greek Art modified by the circumstances and character of the Romans. Ancient History is recommended to students in this course. (2). Mr. Pickard.

110. **Roman Life.**—A systematic study of the topography of Rome and of extant remains particularly of Rome and Pompeii. Lectures and readings. Illustrated by the use of plans, maps, and

lantern slides. As supplementary to this course, Roman Public and Private Life (Latin 105) is recommended. (2). Mr. Pickard.

214. **Topography and Monuments of Athens.**—Frazer's Pausanias will be taken as the basis of discussion. A reading knowledge of Greek, French and German required. (2). Mr. Pickard.

215. **Archaeological Seminary.**—Hours and work to be arranged. Mr. Pickard.

For courses in the History of Art, see page 53.

GREEK.

113a. **The Greek Theater.**—The origin and development of the Greek Theater will be considered, and disputed points in the structure of the theater, and in the presentation of plays will be discussed. The basis of the work will be Doerpfeld and Reisch's *Das Griechische Theater*. (1). Mr. Manly.

114b. **Aristophanes.**—Selected comedies will be read, and the origin and development of comedy will be considered. Attention will also be given to the life of the people as revealed in the plays. (2) or (3). Mr. Scoggin.

115a. **General Introduction to the Science of Language.**—Lectures, assigned reading, and reports. Among the topics dealt with in the lectures are, the history and methods of the comparative study of language, the relation and distribution of the languages of the earth, the origin of language, analogy, phonetic and semantic change, international languages, and spelling reform. The student will need Oertel's *Lectures on the Study of Language*. The other necessary books are in the library. (3). Mr. Scoggin.

216. **Hesiod and Homeric Hymns.**—Students should provide themselves with Hesiodi Carmina ed. A. Rzach, Teubner, Leipzig and Hymni Homerici ed. A. Baumeister, Teubner, Leipzig. (2) or (3). Mr. Manly.

217. **Homer.**—The whole of the Iliad and the Odyssey will be read during the year with especial attention to the antiquities. A special subject will be assigned each student for investigation. Teubner text editions of the poems should be secured in advance. (2) or (3). Mr. Manly.

218a. **Historical Greek Grammar.**—Phonology and Morphology. The lectures will deal systematically with noun and verb

inflection within the Greek language itself. The student should procure Brugmann's *Griechische Grammatik* and Solmsen's *Inscriptiones Graecae ad illustrandas dialectos selectae*. (3). Mr. Scoggin.

219b. **Historical Latin Grammar.**—The sounds and inflections of the Latin language will be set forth briefly in lectures. The student should own Lindsay's *Latin Language* and the same author's *Latin Inscriptions*. (3). Mr. Scoggin.

220. **Elementary Sanskrit.**—Elements of the language. Translation of Sanskrit into English and English into Sanskrit. Thorough drill in forms. Whitney's *Grammar*. Lanman's *Reader* and Perry's *Primer*. (3). Mr. Scoggin.

LATIN.

104. **Latin Prose Composition.**—(Prerequisite, course 2). (1). Mr. Riedel.

105. **Roman Public and Private Life.**—(Prerequisite, Courses 1, 3b, and 3.) (a) Cicero's Letters; (b) Pliny's Letters. (3). Mr. Jones.

106a. (a) **Catullus, Tibullus, and Propertius;** (b) **Juvenal and Persius.**—(Prerequisite, Courses 1, 3b, 3, 105). (3). Mr. Miller.

109. (a) **Plautus and Terence;** (b) **Lucretius.**—(Prerequisite Courses 1, 3b, 3, 105). (Not offered in 1912-13). Miss Johnston.

110. (a) **Tacitus, Annals;** (b) **Quintilian X-XII.**—(Prerequisite, Courses 1, 3, 3b, 105). Mr. Riedel.

111. **Rapid Reading.**—(Prerequisite Courses, 1, 3b, 3). (Not offered in 1912-13). Miss Johnston.

112. **Roman Literature.**—Characteristic selections. (Prerequisite, Courses 1, 3b, 3, 105). Miss Johnston.

217. **Seminary.**—Roman Satire from Ennius to Juvenal with lectures on the origin and development of satire. (3). Miss Johnston.

220. **Introduction to Latin Epigraphy.**—Includes a study of representative inscriptions. (1). Mr. Miller.

224. **Latin Metre.**—During the first semester, especial atten-

tion will be given to the metre of comedy and dactylic hexameter, during the second semester to lyric measures. (1). Miss Johnston.

GROUP OF MODERN LANGUAGES.

ENGLISH.

104. **The Romantic Movement.**—The revolt against classicism in the eighteenth century; the romantic triumph in Scott, Wordsworth, and Coleridge; the radicalism of Byron and Shelley; the neo-classicism of Keats. (3). Mr. Tisdell. (Alternates with 109. Not given 1912-13).

105. **English Literature of the Eighteenth Century.**—First Semester: Dryden and Pope. Second Semester: Swift and the Essayists. (3). Mr. Belden.

106. **Style and Usage.**—An advanced course in the theory and practice of English composition, involving the investigation of important questions of usage, structure, and style. (3). Mr. Miller.

107. **Shakespeare.**—Four or five selected plays; class-room reading and interpretation. A thesis is required. (3). Mr. Fairchild.

108. **Shakespeare.**—The course will be devoted to the history of Shakespeare criticism and to the study of some of the formal elements of the plays (technique, language, versification, etc.). Should be taken in conjunction with or after course 107. (2). Mr. Fairchild. (Not given 1912-13).

109. **Tennyson and Browning.**—An intensive study of the poetry of Tennyson and Browning. Lectures and collateral reading in the literature of the Victorian period. (3). Mr. Tisdell.

110. **American Literature.**—(a) Sectional development; (b) growth of nationality; (c) present tendencies. The leading writers in prose and verse will be considered, first, as to their intrinsic worth; and secondly, as illustrative of national development. (3). Mr. Belden. (Alternates with 105. Not given 1912-13.)

111. **History of the English Language.**—An introductory course on linguistic study, taking first the present facts of the language, its sounds, vocabulary, inflections, and syntax, and second its past development through each period. No previous

knowledge of Anglo-Saxon or Middle English is required. (3). Mr. Ramsay.

112a. **Anglo-Saxon Literature.**—An early reading knowledge of Old English will be sought, to be followed by rapid reading of a variety of selected texts chosen rather to illustrate Anglo-Saxon life and thought than for intensive phonological study. (3). Mr. Belden.

113b. **Middle English Literature.**—The class will read a large number of selections representative of different aspects of medieval English life and literature from the Norman Conquest to Chaucer. (3). Mr. Rankin.

114. **Modern Prose Writers.**—A study of the works of representative authors, with weekly reports and monthly essays. (3). Mr. Miller.

127a. **The Argumentative Address.**—A study of the principles of argumentation; practice in the drawing of briefs and in the writing of forensics; debating. (3). Mr. Tisdell.

116b. **Debating.**—Investigation of special questions; practice in debate. Designed especially for members of the debating squad. (This course naturally follows 127a). (3). Mr. Tisdell.

126b. **The Expository Address.**—A study of structure and style with special reference to the expository address; collateral reading in oratorical literature; practice in writing and speaking. (2). Mr. Tisdell.

117. **Recent and Current English Literature.**—The representative writers and literary movements in England from about 1875 to the present day will be studied principally by lectures and reports. During the first semester the leading poets, novelists, and essayists of the period will be considered, with special emphasis upon Stevenson, Swinburne, Wilde, Meredith, Hardy, and Kipling. The second semester will be devoted to a study of the chief movements still in progress, realism and naturalism, symbolism, nationalism, as manifested in contemporary drama, fiction, and poetry. (3). Mr. Ramsay.

This course is open only to students who have taken 3 and either 104 or 109.

118. **English Versification.**—(2). Mr. Miller.

119. **Theories of Poetry.**—Theories of poetry in general, and the application of the principles of criticism to the different lit-

erary forms such as the lyric, the epic, and the drama. (2). Mr. Fairchild.

215. **Beowulf.**—The study of the poem will be pursued as an exercise in Old English phonology, in text-criticism, and in the investigation of poetic principles. (3). Mr. Belden. (Not given 1912-13.)

216. **Historical Grammar.**—A selected series of topics in the development of Primitive Germanic, Anglo-Saxon, and Middle English. (3). Mr. Ramsay.

218a. **Medieval Romances.**—A study of the chief cycles of the medieval romances as illustrated by the English metrical versions. Problems of the origin and development of the romance and of its influence on subsequent literature. Open only to students who are acquainted with Middle English. (2). Mr. Rankin.

219b. **Popular Ballads.**—A study of popular poetry on the basis of Child's *English and Scottish Popular Ballads*, with analysis of the theories of Gummere, Meier, Henderson and others, and illustrations from balladry in Missouri. (2). Mr. Belden.

220. **Literary Criticism.**—The history of critical theory will first be traced and the standard works read. This will be followed by more distinctly constructive work in which the problems of criticism will be considered and an attempt made to determine the grounds of literary judgment. (3). Mr. Fairchild. (Not given 1912-13.)

222. **The Rise of the Drama.**—From the beginning of the modern drama in the liturgical plays of the tenth century, through the English miracles, moralities, and interludes, to the immediate predecessors of Shakespeare. (3). Mr. Ramsay. (Alternates with 228. Not given 1912-13.)

223. **Elizabethan Drama.**—History of the earliest Elizabethan Drama; study of the works of Lyly, Kyd, Greene, Peele, and Marlowe; the doubtful plays of Shakespeare. (3). Mr. Fairchild.

GERMANIC LANGUAGES.

104a and 104b. **Masterpieces in Modern German Drama, Lyrics, and Novel.**—Intensive study, from the literary and cultural side, of a number of carefully chosen Modern German dramas,

lyric poems, and novels. Parallel reading and reports. (3). Mr. Almstedt.

105a. **Outline Course in German Literature.**—The aim of the course is to acquaint the student with the most important works and movements in the evolution of German literary life. (3). Mr. Hoffman.

106b. **Lessing.**—Lectures on Lessing's life and works; intensive study of Lessing the dramatist and the critic; essays written in German. Course conducted in German. (3). Miss Stewart.

107. **Schiller.**—This course will consist in the study of Schiller's *Jungfrau von Orleans*, *Maria Stuart*, *Braut von Messina*, *Wilhelm Tell*, *Wallenstein*; essays in German, based on the texts; Lectures on Schiller's life and works. Course conducted in German. (3). Mr. Hoffman.

108. **Goethe.**—Lectures on Goethe's life and works; intensive study of Goethe's prose, poetry, and dramas; essays written in German. Course conducted in German. (3). Mr. Almstedt.

109b. **Outline Course in Historical Grammar.**—This course together with 105a is arranged to meet the needs of the prospective teacher of German. Though a knowledge of the older periods is desirable, it is not required. (3). Miss Stewart.

110b. **Advanced Composition and Conversation.**—Advanced course in German theme-writing; discussions of grammatical, syntactical, and stylistic points. This course is intended for teachers of German or for students who propose to become teachers of German; conducted in German. (2). Mr. Hoffman.

111b. **Middle High German.**—(Introductory Course.) For advanced seniors. The class will study *Der arme Heinrich* by Hartmann von Aue. Translation into modern German of mediaeval idiom. (3). Mr. Almstedt.

212. **German Literature of the Second Half of the 19th Century.**—This course will consist of lectures and reports. During the first semester Hebbel, Ludwig, Freytag, and Wagner will be especially emphasized. The minor authors will be treated in lectures. The second semester will be devoted to a study of the realistic writers of Germany, especially Hauptmann, Sudermann, Wildenbruch and Fulda. The foreign influence on these writers will be carefully considered. (3). Mr. Price.

213b. **Romanticism.**—This course is intended to comprise an exhaustive study, as far as is possible, of German romanticists and their works; and to show the relation of this movement to similar ones in other literatures (3). Mr. Hoffman.

214a. **The Reformation and Renaissance (1500-1750).**— This course is to give the student a clear view of the development and decline of the literary tendencies, forms and ideals of this period, and the influences that help to develop them or to accelerate their decline. (3). Mr. Hoffman.

215b. **Middle High German.**—Walther Von der Vogelweide. Discipline in phonology; morphology, syntax; comparison of mediaeval with modern idiom; a study in lyric poetry. (3). Mr. Almstedt.

216b. **History of the Nibelungenlied.**—This course is to comprise a study of the various theories as to the origin and authorship of the poem, the controversies in regard to it, and its relation to the Nibelungensaga and other sagas. A reading knowledge of Middle High German is required. (3). Mr. Hoffman.

217b. **Old High German.**—Phonology and forms; critical reading of Old High German texts. Prerequisite, Course 220a. Texts: Braune, *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*. (3). Mr. Almstedt.

218a. **Old Norse.**—Phonology and forms; critical reading of one or more sagas. Prerequisite; Gothic (Course 220a). Texts: Kahle, *Altisländisches Elementarbuch* and Heusler, *Zwei Isländer-Geschichten*. (2). Mr. Almstedt.

219b. **Old Saxon.**—Phonology and forms; critical reading of the *Heliand*. A desirable prerequisite: Gothic (Course 220a). (2). Mr. Almstedt.

220a. **Gothic.**—Phonology, morphology, and syntax; reading from *Ulfilas*; the relationship of Gothic to Indo-European and to later Germanic dialects, general introduction to the study of Germanic Philology. (5). Mr. Almstedt.

221. **Current Publications.**—(1) Miss Stewart.

222. **Seminary.**—Subject to be determined. For special students only. (2).

Any other courses in Germanic Languages will be arranged if the needs of the students require.

ROMANCE LANGUAGES.

French.

101. **General Phonetics.**—The organs of speech, sound formation, etc., with special application to the pronunciation of English, French, and German. This course is especially intended for those who are preparing to teach French or some other modern language. (1). Mr. Murray.

104. **Composition and Conversation.**—(Prerequisite, course 3). Translation into French of standard English; original themes; study of syntax, grammatical problems, style; conversation. (2). Mr. Nelson.

106. **French Literature.**—Prerequisite, course 3). A general outline of the various periods. Lectures, reading of selected works from the period and critical works, and reports. Relation of French literature to other European literatures. (3). Mr. Murray.

107. **The Literature of the Seventeenth Century.**—(Prerequisite; course 3. Course 106 is also recommended as a preliminary). A more detailed study of literary movements and writers of the classical period; the development and fixation of forms: the drama, etc.; the development of prose. Comparison with other European literatures. (3). Mr. Underwood.

108. **The Literature of the Eighteenth Century.**—(Prerequisite, course 3). Lectures, reading of selected works from the period, the study of critical works, reports. Comparison with other European literatures. (3). Mr. Nelson.

109a. **The Literature of the Nineteenth Century.**—(Prerequisite, course 3). The revolt against classicism, its causes and results; the Romantic and other movements down to recent times. Lectures, reading, reports. Relation of French literature to other European literatures. (3). Mr. Cavicchia.

109b. **The Literature of the Nineteenth Century.**—(Prerequisite, course 3). Recent and contemporary writers; present literary tendencies in France. Lectures, reading, reports. (3). Mr. Cavicchia.

110. **The Language and Literature Down to the Sixteenth Century.**—(Prerequisite, course 106). Lectures. (1). Mr. Murray.

111. **The Literature of the Sixteenth Century.** — Lectures, readings, reports. (2). Mr. Nelson.

212. **Seminary in French Literature.**—Detailed study of some literary movement or representative writer. *Two, three or four hours credit.* Mr. Murray.

214. **General Introduction to Romance Philology.** (2). Mr. Murray.

215. **Old French.**—(Prerequisite, course 214). (2). Mr. Murray.

216. **Seminary in Romance Philology.**—Provençal, Old Spanish, Old Italian. (2). Mr. Warshaw; Mr. Cavicchia; Mr. Murray.

Italian.

121. **Dante.** *First semester: La Vita Nuova; L'Inferno. Second Semester: Il Purgatorio; Il Paradiso.* (3). Mr. Murray or Mr. Cavicchia.

122a. **Petrarch and Boccaccio.**—(2). Mr. Murray or Mr. Cavicchia.

122b. **The Sixteenth Century.** Pulci, Ariosto, Tasso, etc. (2). Mr. Murray or Mr. Cavicchia.

Italian Philology.—See courses 214 and 216.

Spanish.

132. **General Survey of Spanish Literature,** with special emphasis on the period of Cervantes, Lope de Vega, Calderón. The relation of Spanish literature to other literatures. Among the works read in 1911-12 were: *Don Quixote, La Vida es Sueno, Don Gil de las Calzas Verdes, Marcos de Obregon.* (2). Mr. Warshaw.

233. **Seminary in Spanish Literature.**—Detailed study of some literary movement or representative writer. (2). Mr. Warshaw.

Spanish Philology. See courses 214 and 216.

GROUP OF PHILOSOPHY AND EDUCATION.

EDUCATION.

110a. **Educational Psychology.**—(Advanced Course.) This course aims to give a thorough treatment of a few of the most important phases of mental development, and is adapted both to those who have had an elementary course in this field and to those who have had an extensive course in General Psychology without reference to educational problems. (3). Mr. Pyle.

111b. **Scientific Testing of Methods.**—It is the purpose of this course to apply the results of psychological investigations to the problems of the school room, in examining and testing methods of teaching, the classification and grading of pupils, and the determination of individual types and capacities. Prerequisite, 110a or its equivalent. (3). Mr. Pyle.

112a. **The Abnormal Child.**—A study of subnormal and super-normal children from the standpoint of genetic psychology. Examination of the causes of these deviations, tests for their determination and a study of their proper treatment. (1). Mr. Pyle.

113. **Current Problems.**—A study of current problems in education from the point of view of psychology. Informal discussions and reports of periodical literature in educational psychology. The object of this course is to acquaint the student with present-day educational problems and give a basis and perspective for their scientific consideration. (1). Mr. Pyle.

120. **History of Education.**—The purpose of this course is to give a better understanding and appreciation of present educational tendencies by tracing historically those educational movements which have been most effective in determining the present educational situation or are typical or prominent aspects of it. (2). Mr. Coursault.

121a. **Educational Classics.**—An intensive study of the historical setting and content of a few educational classics which mark prominent movements in the development of educational thought and practice. (3). Mr. Coursault.

122b. **History of Education in the United States.**—A research course for advanced students. (2). Mr. Coursault.

130a and 130b. **Theory of Teaching.**—A general course which aims to formulate a method of class work, and to illustrate as fully

as time will permit its application to subjects in all grades of school work. (3). Mr. Charters.

150a. **School Supervision.**—A study in the principles of school supervision, in which emphasis is laid upon the relation between superintendent, supervisors, teachers, and pupils. Practical problems such as attendance, classification, government, reports, exhibits, will be briefly considered on the basis of this relation. The course consists largely of observational studies in the University Schools and the reading of literature descriptive of the nature of youth. (2). Mr. Meriam.

150b. **Supervision of Instruction.**—A study in the principles and practice of class criticism, arranged for superintendents, principals, and supervisors in public schools and normal schools. Outlining studies, providing materials of instruction, helping pupils study, determining upon tests of efficiency, are the leading problems in the course. Laboratory work supervising in the University schools is a part of this course. (3). Mr. Meriam.

151. **Elementary Education.**—A study is made of the function of the elementary school in modern life and the nature of the curriculum needed to meet this aim. Elementary problems of school management and current methods of teaching reading, arithmetic, geography, etc., are studied. This course is planned for those preparing for special work in teaching or supervising in elementary schools, and includes much observation and laboratory work in the University Elementary School. (1), (2) or (3). Mr. Meriam.

160a and 160b. **School Economy.**—A course in effective methods of school management from the standpoint of the teacher in secondary schools. (2). Mr. Alexander.

161a. **School Administration.**—A general treatment of the important administrative problems of principals and superintendents in small city school systems, for which the class meets twice a week. The third hour of credit will be given for individual practice work in the investigation and solution of practical problems involved in the administration of the University High School, the University Elementary School and the Columbia Public Schools. (3). Mr. Alexander.

163a. **High School Problems.**—(Prerequisite, Education 2a and 120 or equivalent.) A consideration from the standpoint of the administrator of the main problems now confronting secondary education in the United States, with special reference to conditions

in Missouri. The principal topics considered are: relation of high school to elementary school, college and community; organization and direction of teaching staff; equipment; government; reorganization of curriculum with special attention to vocational training, physical education and social life of high school; elimination of pupils; keeping, interpretation and use of high school statistics; financing of secondary education. Open for credit only to superintendents, high school principals, and experienced high school teachers. (2). Mr. Elliff, Mr. Alexander.

167b. **Social Aspects of Educational Administration.**—(Prerequisite, Education 120 and Sociology 1a, or equivalent.) An application of the principles of sociology to the problems of social welfare as achieved through organized educational activities. A special study of the demands of democratic society in the United States upon the administration of public education. The social significance and administrative methods of those phases of education which have only special application or which are yet tentative in character, such as education of special classes, vocational training, compulsory education, child labor legislation, etc. (2). Mr. Alexander.

168b. **Advanced Practice in School Administration.**—(Prerequisite, Education 161a.) A continuation of the practice work begun in Education 161a. For 1912-13 such practice work will deal mainly with fiscal administrative problems. (3). Mr. Alexander.

169. **Statistical Methods in Education.**—(Prerequisite, Education 161a, or equivalent.) This course aims to provide principals, superintendents, and students of education with sufficient technical knowledge of statistics to enable them to use conveniently and profitably the data available in any school system. The first semester's work deals with the theory of statistics, the scope and limitations of statistical methods as applied to school problems, the examination of typical statistical studies of educational data, and the working of appropriate exercises by the class. This semester's work may be taken alone and is especially recommended as a preparation for Education 111b, 211 and 261. The second semester's work deals with statistical investigations of educational problems by members of the class. By special arrangement with the instructor, any student in the School of Education at work on an educational problem to which statistical methods are applicable, may do the statistical part of the investigation for credit in the second semester of this course. (2). Mr. Alexander.

170b. **Principles of Education.**—The purpose of this course is to give insight into the meaning of education and thereby to reveal the fundamental principles upon which educational procedure should rest. (3). Mr. Coursault.

180a and 180b. **Practice Teaching.**—Hours and credit must be arranged with the instructor before registration. Application should be made in the semester preceding that in which this course is wanted. Mr. Meriam and Mr. Charters.

210. **Seminary in Educational Psychology.**—The special problems selected for study will depend upon the interest of those taking the course, the aim being to guide advanced students of Education in constructive work in the theory of education through a detailed study of a few aspects of mental development. The course is open only to students who have had considerable training in both education and psychology. For thesis work. *Credit to be arranged.* Mr. Hill and Mr. Pyle.

211. **Research Course in Educational Psychology.**—Original investigation of problems in mental development or in any field of educational psychology. Open only to students who have had training in both general and educational psychology, including training in psychological method. *Credit to be arranged.* Mr. Pyle.

220. **Seminary in the History of Education.**—A critical investigation of topics in connection with the thesis work for the graduate degree. Mr. Coursault.

230. **Seminary in Theory of Teaching.**—An intensive study of some problems in theory of teaching. The problems selected will depend in part upon the interests of the students. Considerable use is made of psychology and history of education, satisfactory work in both being a prerequisite to this course. (3). Mr. Meriam and Mr. Charters.

250. **Seminary in School Supervision.**—An intensive study of problems in connection with thesis work for graduate degrees. Opportunity is offered for experimental work in the University Schools. Mr. Meriam.

251. **The Public School Curriculum.**—Research work on courses of study for elementary schools and for high schools. A close examination is made of typical curricula in schools of this country and foreign countries; also curricula of special schools. Study is made of the development of the curriculum to meet chang-

ing social and industrial conditions in community and national life, and to comply more adequately with the psychological development of the pupil. (3). Mr. Meriam.

260. Seminary in School Administration.—A research course in school organization and administration with special reference to city school systems. The course is open only to teachers of considerable experience in school supervision who are otherwise qualified to undertake research work, and is to be taken in connection with thesis work for the graduate degree. Mr. Elliff and Mr. Alexander.

261. Administration of Public Education in the United States.—(Prerequisite, Education 120, 161a, and Sociology 1a or their equivalent.) An intensive study of the problems that confront the administrator in the organization and administration of public school systems in the United States, with special reference to city systems in Missouri. The course will include practice in the interpretation of school statistics, in the organization of systems of records for keeping such statistics and in the effective presentation of school information to the public. Open only to superintendents and principals of considerable administrative experience, who obtain the consent of the instructor. The special report required in this course may be made the basis of the master's thesis for men specializing in administration. (3). Mr. Alexander.

270. Seminary in Philosophy of Education.—An intensive study of Philosophy of Education made in connection with thesis work for the graduate degree. Mr. Coursault.

271. Philosophy of Education.—This course begins with a critical study of typical theories of knowledge and leads to a voluntaristic theory, in the interpretation of which a philosophy of education is developed. The fundamental ideas acquired are then used in the interpretation and criticism of a variety of modern contributions to educational literature. (3). Mr. Coursault.

In addition to the above, a number of courses in the teaching of Botany, English, German, etc., and in the Administration of School subjects are offered and may be counted as Education for the degree of Master of Arts.

For a statement of these courses, see the announcement of the School of Education in the General Catalogue.

EXPERIMENTAL PSYCHOLOGY.

These courses are open only to students who have had an introductory course in General Psychology.

103a or b. **Differential Psychology.**—A study of individual differences in character and intelligence, their causes, and their practical significance in life, particularly in school, in civil service, and in legal practice. (2). Mr. Meyer.

104a or b. **General Esthetics.**—An experimental as well as theoretical study of the psychological laws underlying our appreciation of the beautiful, chiefly in the arts of painting, sculpture, and architecture, and also in nature. No familiarity with the technic or history of art is required. The aim of this course is to develop in the student an independent judgment in questions concerning the beautiful. (3). Mr. Meyer.

105a or b. **Theory of Music.**—The esthetic laws of music. The psychological differences between primitive and highly developed music, and between European and exotic music. (3). Mr. Meyer.

106a or b. **Principles of Psychology.**—Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. (3). Mr. Meyer.

107a or b. **Comparative Psychology.**—Mental development. Experiments upon the mental processes of animals. Theories of mental evolution. (2). Mr. Meyer.

108a or b. **Abnormal Psychology.**—The abnormalities of mental life resulting from inborn, pathological, or artificial causes (such as idiocy, aphasia, apraxia, somnambulism, hypnosis, etc.) and their educational, medical and forensic significance. (2). Mr. Meyer.

109a or b. **Psychological Systems.**—A comparative study of the psychological systems as found in the chief text-books on psychology issued during the last thirty years. (4). Mr. Meyer.

211a or b. **Psychological Seminary and Advanced Laboratory Work.**—Critical reading of recent literature. Discussion of special problems and theories. Research work. Mr. Meyer.

PHILOSOPHY.

103a. Ethical Theory.—An introductory study of the main problems of ethics and of the chief methods of their solution, with constant reference to the principal historic schools for illustration and interpretation. The following topics will be included: the nature and method of ethics as a philosophical discipline; freedom; the ground of obligation; conscience; egoism and altruism; optimism and pessimism; hedonism; utilitarianism; intuitionism; self-realization. (3). Mr. Hudson.

104a. History of Ancient and Medieval Philosophy from the Ionian Schools to Bacon.—The work of the course will include a careful reading of the greater part of Plato's *Republic*. Lectures, required reading, oral and written reports. (3). Mr. Rogers.

104b. History of Modern Philosophy from the Renaissance to the 19th Century.—Lectures, class-room discussions, required reading, written reports. (3). Mr. Rogers.

105b. Contemporary Tendencies in Metaphysics.—A consideration of representative systems, issues, and controversies of the present day, together with their general relations to historic philosophy. Stress will be laid upon the problems and tendencies characteristically modern in their setting, such as those aroused by the development of modern science. Lectures, required reading (including reference to the principal philosophic journals), reports and conferences. Open only to those who have had 104b or its equivalent. (3). Mr. Hudson.

109a. English Thought in the Nineteenth Century.—An untechnical account of the main tendencies which have influenced popular thought in recent times. It will deal with such men as Wordsworth, Shelley, the Utilitarians, Spencer, Arnold, Carlyle, Tennyson, Ruskin, Emerson, Stevenson and others. In the last part of the semester contemporary writers will occupy a considerable portion of the time. Lectures, reading and discussion. (3). Mr. Rogers.

112b. American Ideals.—A study of the ethical interpretations of life implied in American social and political institutions. (3). Mr. Hudson.

113a. The Philosophy of Herbert Spencer.—A study of Spencer's philosophy, with special reference to the conception of evolution as a fundamental philosophical point of view. Readings, discussions and papers. (3). Mr. Rogers.

GROUP OF HISTORY AND POLITICAL SCIENCE.

ECONOMICS.

105a and b. **Money, Credit, and Banking.**—This course involves a study of the relation of the production of the precious metals and the banking business to the supply of money and the prices of commodities. An inquiry is also made into the organization and operation of the banking business in the leading nations with special reference to its bearing on the loan and discount rates and the development of business. Mr. Bell.

106a or b. **Economics of Transportation.**—A history of the development of transportation agencies, and a study of the principles of rate-making and rate-regulation. (3). Mr. Huse.

108a or b. **Insurance.**—The general principles, the different forms of personal and property insurance and the main problems connected with each. (2). Mr. Davenport.

113a or b. **Public Revenues.**—A critical examination of (1) the various theories as to the limits of State activity; (2) Various ethical systems as related to the problem of Justice in Taxation; (3) Proportional vs. Progressive taxation; (4) The later developments in Value Theory as bearing on the more difficult problems of Incidence; (5) The administrative aspects of Income Taxation; (6) Ethical, legal, and constitutional aspects of Franchise and Corporation Taxation; (7) The practicability of a scientific articulation of the various taxes under American conditions. (3) to (5). Mr. Davenport.

Accounting.—This course treats of the constructions and interpretation of the accounts of the private business, the partnership and the corporation. It involves a study of the use of the income account and balance sheet in connection with the capitalization and valuations of property, and the relation of cost accounts to business and industrial efficiency. (3) to (5). Mr. Bell.

Trusts and Combinations.—This course treats of the development of business organizations, the financing of such enterprises, their relations to the control of industry, the prices of commodities and the distribution of wealth. (3) to (5). Mr. Bell.

210a or 210b. **Problems of Labor.**—A study of the special problems and interests of wage earners, such as the organization

and policies of trades-unions, employers' associations, arbitration, profit-sharing, factory acts and other forms of labor legislation. (3) to (5). Mr. Huse.

211. **Advanced Economic Theory.**—A critical examination of the writings of the leading economists from the time of Adam Smith to the present to the end of constructing a correct theory of value and distribution. A survey of the theoretical aspects of the science. Credit to be arranged. Mr. Davenport.

214. **History of Economics.**—A first-hand study of authors and documents, with especial reference to the background of political and industrial conditions and of philosophical thought. (2) or (5). The student is advised to correlate this course with related courses in Philosophy, Political Science, History and Sociology. Mr. Veblen.

212. **Seminaries.**—Credit to be arranged. Mr. Bell, Mr. Davenport, Mr. Huse, Mr. Veblen.

219. **Economic Factors in Civilization.**—An inquiry into institutions as affected by economic conditions with a view particularly to early European civilization. (2) to (5). Mr. Veblen.

232a or 232b. **Socialism.**—A consideration of the essential features of the socialistic program from the standpoint of economic and sociological theory. An examination will be made of some of the writings of representatives of different types of socialistic thought. Particular attention will be given to those of Karl Marx and of the leaders of modern French and German Socialism. (2) to (3). Mr. Veblen.

HISTORY.

100b. **Recent European History.**—The political, social and institutional history of the chief European countries since 1815 will be carefully studied with a view to present conditions. (5). Mr. Wrench.

150a. **European Culture and Civilization—the Middle Ages.**—A careful study of the blending of the Graeco-Roman, German, and Christian elements of culture during the early mediæval and a study of their development in the later mediæval periods. (2) or (3). Mr. Wrench.

155b. **European Culture and Civilization—the Renaissance.**—An examination into the causes and character of European cul-

ture and civilization during the thirteenth, fourteenth, and fifteenth centuries. Should be preceded by 150a or equivalent. (2) or (3). Mr. Trenholme.

110. **History of the United States.**—This is an advanced course for mature students beginning the study of American History in the University. The period since 1763 will be especially emphasized. (3). Mr. Viles.

140a. **American Social History.**—A survey of the development of American society, with emphasis on the economic and social progress since the Revolution. (3). Mr. Stephens.

170b. **History of Missouri.**—The primary aim of this course will be to give an account of the development of Missouri since 1803. (3). Mr. Viles.

145a. **History of the West.**—A study of the westward movement of population, the economic, social, and political development of the west, and the reaction of western ideals and influences on United States history. (2) or (3). Mr. Viles.

175b. **History of the South.**—A study of the economic, social, and political development of the south. The agricultural system, with its dependence upon unfree labor and the resulting political theories, will make up the background to the course. (2) or (3). Mr. Stephens.

120b. **English Constitutional History.**—An advanced English History course dealing with the growth of English government and law as a background to present conditions in the British Empire and America. (3). Mr. Trenholme.

215. **Rome and the East.**—The Roman conquest of the Eastern Mediterranean, the Euphrates frontier, the financial organization, and the social, religious and economic development of the subject peoples. (2). Mr. Olmstead.

135a. **Oriental History (to 600 A. D.)**—Political and social history of the early Oriental peoples of Assyria, Babylonia, Egypt and Israel. Greece and Rome in their relations with the Orient. (3). Mr. Olmstead.

135b. **Oriental History (600-1900.)**—A study of the political and social aspects of the rise of Islam with special emphasis on the relations between Western Asia and Europe. (3). Mr. Wrench.

(The two preceding courses, though they may be taken separately, together form a complete survey of the history of Western Asia.)

115b. **European Expansion in Asia.**—The causes and methods by which the European nations have gained and maintained a foothold in Asia. (2). Mr. Wrench.

160. **Historiography and Historical Method.**—A course of training for students intending to do advanced and graduate work in history. (1) or (2). Mr. Trenholme, assisted by other instructors in history.

220a. **Seminary Course in American Diplomatic History.**—A study of the foreign relations of the United States with especial emphasis on the diplomatic side of our relations with British America and the Spanish American nations. (3). Mr. Stephens.

230. **Seminary Course in American Political Government and History.**—The course will deal with the origin and significance of Jacksonian Democracy, with especial attention to the social factors and the political leaders. The development of political parties and ideas will also be studied. (2) or (3). Mr. Viles.

250. **Seminary in Historical Research and Thesis Work.**—A course giving opportunity for research and thesis work along special lines. Primarily intended for candidates for graduate degrees. The work of the student will be under the direction of the instructor most interested in the field in which the topic of special research lies. (1), (2), (3), or (4).

Note: In addition to the above the department of History expects to offer a two years' Honors Curriculum, in accordance with the general provisions of the Faculty of Arts and Science, portions of which may be taken for graduate credit by students in the Graduate School.

POLITICAL SCIENCE AND PUBLIC LAW.

103b. **Elements of Jurisprudence.**—An introduction to the study of law. This course treats of the nature, sources and classification of law, and includes a consideration of the fundamental concepts of private law. The nature and use of legal authorities will be discussed. (2). Not given in 1912-13. Mr. Loeb.

104a. **European Governments.**—A descriptive study of the constitutional organization and practical working of the principal

governments of Europe; with considerable attention to political parties and current political questions. (3). Mr. Shepard.

105b. **Comparative Constitutional Law.**—A comparative study of the legal and theoretical basis of the modern state, the various forms of government, and the structure and function of the principal governmental organs. (3). Mr. Shepard.

106b. **Municipal Government.**—A comparative study of the organization, functions, and administration of cities of Europe and the United States. During the latter part of the course special topics will be taken up in more detail, such as: central control over cities, municipal elections, municipal revenue, the regulation of public utilities, and municipal ownership. (2). Mr. Loeb.

201a. **Colonial Government.**—A study of the present government and administration of the colonies of the United States and of other countries. (3). Not given in 1912-13. Mr. Shepard.

202a. **International Law.**—A general treatment of the law governing international relations in peace and war, with considerable attention to the development of arbitration and international organs of administration. (3). Mr. Shepard.

208a. **The Government of Missouri.**—A study of the constitutional development of the state from the Louisiana Purchase to the present time, followed by a consideration of the organization and functions of the institutions of the central and local governments. (2). Mr. Loeb.

204. **Constitutional Law of the United States.**—Particular attention will be given to the field of individual liberty defined in the Constitution of the United States and interpreted in the decisions of the Supreme Court. (3). Mr. Loeb.

209b. **The Law of Taxation.**—A study of the legal rules regulating taxation in the central and commonwealth governments of the United States. The student is advised to correlate this course with related courses in Economics. (2). Mr. Loeb.

210. **History of Political Theories.**—A study of the development of political thought in its relation, as cause and effect, to political action, from the period of antiquity to our own day. (2). Mr. Shepard.

220. **Seminary.**—Credit to be arranged. Mr. Loeb; Mr. Shepard.

SOCIOLOGY.

110a. **Social Pathology.**—A study of the origin, nature, and treatment of the dependent and defective classes. Among the topics treated are the causes of poverty, the causes of degeneracy, the principles of relief, public outdoor relief, organized charity, almshouse administration, the treatment of the vagrant, the care of dependent children, the care of the insane, the feeble-minded, the epileptic, the education of the blind and the deaf. Text-book work and reports by the class on special subjects for investigation. (3). Mr. Parmelee.

111b. **Criminology.**—A study of the causes, nature, and treatment of crime; the principles of criminal anthropology, criminal jurisprudence, and penology. Among the topics treated are criminal statistics, the social causes of crime, the relations of criminality to degeneracy, the anthropology and psychology of the criminal, female and juvenile criminality, the evolution of the criminal law, the reform of modern criminal procedure, modern prison systems, the county jail, the industrial reformatory, the indeterminate sentence, systems of prison labor, probation and parole, the treatment of the juvenile offender. Lectures and assigned reading. (3). Mr. Parmelee.

112b. **Preventive Philanthropy.**—An intensive study of some specific problems in preventive work, including a study of child problems, playgrounds, child labor, and the juvenile court. (2). Mr. Cross.

115a. **Rural Sociology.**—A study of social conditions in rural life. Among the topics considered will be the statistics and movements of rural population, the physical environment of rural life, isolation and means of communication, rural occupations, co-operative organizations among farmers, the family and woman's position in rural life, the country school, the country church, etc. The movements for the improvement of rural life will be considered. Lectures, assigned reading and papers. (2). Mr. Parmelee.

116b. **Urban Sociology.**—A study of social conditions in urban communities. The origin and growth of cities will be considered. An intensive study will be made of educational, political, moral, social, aesthetic, and religious forces and institutions in urban life. Municipal reform movements will be considered. Lectures, assigned reading and papers. (2). Mr. Parmelee.

125. **Anthropology and Ethnology.**—A study of the evolution of man as an animal, and of the evolution and relations of the

different races of mankind. Among the topics considered will be the origin and evolution of man, the fossil remains of man, the old and new stone ages, the specific unity of mankind, the physical and mental criteria of race, the classification of races, the subdivisions, physical, mental, and cultural characteristics of the Negro race, the Mongolian race, the American race and the Caucasian race. Lectures and assigned readings. (3). Mr. Parmelee.

220. Advanced Sociology.—A critical study of sociological theory. The various conceptions of Sociology, its problems, subject matter, and relations will be discussed with a view to laying the foundations for constructive sociological theory in modern Biology and Psychology.

In the second semester the theories of Tarde, Le Bon, Baldwin, and other psychological sociologists will be examined, and further constructive work in interpreting social phenomena upon the basis of modern Psychology will be attempted. Lectures, discussions, and theses by the class. (3). Mr. Ellwood.

221a. Biological Sociology.—A course on the biological basis of sociology. The relation of organic to social evolution will be studied with special attention to heredity, selection, adaptation, and variation. Lectures, assigned reading and research work. (2). Mr. Parmelee.

222b. Social Statistics.—Statistical methods for the investigation of problems in social science will be studied. The principal statistical investigations which have so far been made will be analyzed and one or more problems will be given to each student to furnish practice in quantitative treatment. Lectures, assigned reading and research work. (2). Mr. Parmelee.

226. Ethnic Psychology.—A study of the comparative psychology of races as shown in their customs, institutions, and social organization. (Not given in 1912-13.)

227a. The Negro in America.—A study of the social, economic, moral, and educational conditions among the negroes of the United States. The work will consist of lectures, library work, and theses. Students will be admitted only after consultation. (3). (Not given in 1912-13.)

230. History of Social Philosophy.—Lectures on the development of social thought from Aristotle to the present. The social philosophies of Plato, Aristotle, St. Augustine, Thomas Aquinas, Machiavelli, Bodin, Hobbes, Locke, Vico, Montesquieu, Rousseau,

Condorcet, and the sociological systems of Comte, Spencer, Shaeffle, Lilienfeldt, Gumplowicz, Ratzenhofer, and Ward will, among others, be considered. A large amount of assigned reading will be required in this course. The student is advised to correlate this course with related courses in Economics, History, Political Science and Philosophy. (2). Mr. Ellwood.

231a. **History of Philanthropy and the Poor Law.**—A study of the development of legislation governing, and methods of administering public relief in England and America, and the parallel account of voluntary charitable institutions and methods. (2). Mr. Cross.

232a or b. **Socialism.**—See announcement under Economics.

240. **Seminary.**—Research work upon special problems in sociology and philanthropy. Two, three, or four hours' credit will be given according to the amount of work. Mr. Ellwood, Mr. Parmelee, Mr. Cross.

GROUP OF MATHEMATICAL AND PHYSICAL SCIENCES.

ASTRONOMY.

105b. **Modern Astronomy.**—A study of the problems and aims of modern astronomical science; its relation to other sciences. Frequent references to current literature of astronomy. Open to students who have completed Course 1a or 1b. (3).

106. **Advanced Astronomy.**—Subjects are selected to meet the requirements of individual students. Open to students who have completed Course 2 or Courses 4a and 105b. Credit to be arranged.

107. **Advanced Practical Astronomy.**—Theory and use of the equatorial telescope as an instrument of precision; its auxiliaries: the micrometer, the photometer, the spectroscope. Applications of the methods of least squares. Open to students who have completed Course 2, Calculus and General Physics. (3).

108. **Theoretical Astronomy.**—The elements of celestial mechanics. Determination of parabolic and elliptic orbits; construction of ephemerides. Application to comets and spectroscopic binary stars. Open to students who have completed Course 107. (3).

209. **Astrophysics.**—The application of physical principles to astronomy. Methods and results, with their bearing on solar and stellar phenomena. Studies in photometry and radial velocity. Credit to be arranged.

220. **Research.**

CHEMISTRY.

111. **Organic Chemistry.**—Lectures, recitations, and laboratory work. (3). Mr. Calvert, Mr. Dutcher, Mr. Schaefer.

112a. **Preparation of Organic Compounds.**—A laboratory course in synthetic organic chemistry. May be taken with course 111. (2) or (3). Mr. Calvert.

113b. **Preparation of Organic Compounds and Organic Analysis.**—Laboratory Course. (3), (4) or (5), according to the amount of work elected. Mr. Calvert.

121. **Quantitative Chemical Analysis.**—The general principles of gravimetric and volumetric analysis. Laboratory work and lectures. (3). Mr. Gibson.

122a. **Technical Analysis.**—(Prerequisite, Quantitative Analysis 121). Gas, water, and fuel analysis. Required of chemical engineers. (3). Mr. Gibson, or Mr. Brown.

123b. **Technical Analysis.**—(Prerequisite, Quantitative Analysis 121). The analysis of commercial products of an inorganic character. (3). Mr. Gibson, or Mr. Brown.

125a. **Quantitative Organic Analysis.**—(Must be preceded or accompanied by Quantitative Analysis 121). Quantitative analysis of commercial organic products, such as alcohols, aldehydes, organic acids, glycerine, oils and fats, carbohydrates, petroleum products, soaps, etc. (3). Mr. Calvert.

126b. **Quantitative Organic Analysis.**—A continuation of 125a. (3). Mr. Calvert.

127. **Advanced Qualitative Analysis.**—(Prerequisite, Qualitative Analysis 27a or 27b). The complete qualitative analysis of rocks, minerals, slags, and alloys. (2). Mr. Gibson.

131. **Physical Chemistry.**—(Prerequisite, Organic Chemistry 111). Stoichiometry of gases, liquids and solids; solutions and the theory of ionization; thermo-chemistry; the phase rule;

chemical equilibrium. Lectures or recitations (two), laboratory (one), (two) or (three). According to amount of laboratory work elected, (3), (4) or (5). Mr. Schlundt.

133. **Electro-chemistry.**—(Prerequisites, Organic Chemistry 111; Physics 3). Lectures, recitations and laboratory work in electro-chemical measurements. Lectures (two); laboratory. According to amount of laboratory work elected (3), (4) or (5). Mr. Schlundt.

135a or 135b. **Radioactivity.**—(Prerequisites, undergraduate courses in physics and chemistry). Lectures, recitations, and laboratory work on the radioactive types of matter and atomic disintegration. An introductory course. (3). Mr. Schlundt.

141a. **Industrial Chemistry.**—(Prerequisite, Qualitative Analysis 27a or 27b, Organic Chemistry 111). Lectures and recitations on the application of chemistry to the purposes of human life as illustrated in the more important arts and industries having a chemical basis for their principal operations and processes. Fuels, water, acids, fertilizers, cements, glass, pottery, paints, gas, explosives, metals, alloys, etc. Thorp's *Outlines of Industrial Chemistry* for reference. Additional credit may be obtained in this course by arranging for laboratory work. (3). Mr. Brown.

142b. **Industrial Chemistry.**—(Prerequisites, same as for 141a). Starch, glucose, sugar, fats, oils, soaps, dyes, and other industries. Lectures and recitations. (2) or (3). Mr. Brown.

151a or 151b. **History of Chemistry.**—(Prerequisites, Organic Chemistry 111, and Physical Chemistry 131). May be taken along with course 131. (3).

200. **Chemistry of the Rare Earths.**—(Prerequisites, Quantitative Analysis 121). Lectures, recitations, and laboratory work on the occurrence, distribution, properties, and uses of the rare earths. (3). Mr. Brown.

211a and 212b. **Advanced Organic Chemistry.**—(Prerequisites, Organic Chemistry 111). Lectures on selected topics, supplemented by reading and reports on classical researches. (2) or (3). Mr. Calvert.

221. **Advanced Quantitative Analysis.**—(Prerequisite, Quantitative Analysis 121). Chiefly laboratory work. The complete quantitative analysis of rocks, ores, minerals, slags, and various commercial materials and products. The work of the course will

be varied to meet the needs of the individual. Credit to be arranged. Mr. Gibson.

231. **Mathematical Chemistry.**—(Prerequisite, Chemistry 131). Lectures on the applications of the operations of the higher mathematics to the study of chemical reactions. (2). Mr. Morlan.

232a and 232b. **Advanced Physical Chemistry.**—(Prerequisites, courses 131 and 121). Lectures on selected topics, supplemented by reading and reports on classical researches. A reading knowledge of German and French is very desirable. Credit to be arranged. Mr. Schlundt.

271. **Research.**—Research work is offered in the various lines of chemistry given in this department. Arrangements for research work should be made by consultation with the professor or instructor whose work is elected.

The University of Missouri Section of the American Chemical Society meets fortnightly for reports on current literature and researches in progress in the University. Students are invited to be present. Fridays at 7:00 p. m.

The students of the department conduct a chemical club which meets fortnightly.

GEOLOGY AND MINERALOGY.

100a. **Economic Geology.**—(Prerequisites, courses 1a or 1b, and elementary chemistry, and Geology 4b or 5a if the course is taken as graduate work). In this course the origin, mode of occurrence, distribution, uses, methods of obtaining, and conservation of deposits of coal, oil and gas, clays, building stones, cement materials, gypsum, fertilizers, and minor minerals are studied. Field trips to mines and quarries near Columbia will be made. Students will study in laboratory the materials discussed in the class room. (3). Mr. Tarr.

101b. **Economic Geology.**—(Prerequisites, courses 1a or 1b, and elementary chemistry, and Geology 5a if the course is taken as graduate work). In this course deposits of the ores of iron, copper, lead, zinc, silver, nickel, aluminum, and the minor metals are studied with reference to their origin, form, geographic distribution, methods of obtaining, production, uses and conservation. Students study in laboratory the main ores of each metal. (3). Mr. Tarr.

102b. Advanced Physiography.—(Prerequisite, 1a or 1b, or 6a or 7b). A lecture, text-book, and conference course intended for those who wish to do advanced work in geology, and for those who expect to teach physiography in secondary schools. The method will be topical and considerable reading will be required. (3-5).

103b. Historical Geology.—(Prerequisites, course 1a or 1b. Courses 4b and 6a are desirable antecedents). This course considers briefly hypotheses for the origin of the earth, and more fully principles of sedimentation, distribution and kinds of rocks of each geologic period, geographic changes of the North American continent and causes for geographic changes, and incidentally the climate and life of each period. Several field trips are made for the study of the strata in northern Missouri. (3). Mr. Branson.

104b. Geologic Life Development.—(Prerequisites, courses 1a or 1b and a course in zoology. 103a is a desirable antecedent). This course considers the changes that have taken place in the life of the earth from its first appearance to the present and the causes for these changes. The life of each geologic period is considered first as a whole, and then in its relationships to the life of the preceding and following periods. In the laboratory students examine specimens that illustrate the gradual evolution toward living types. (3). Mr. Branson.

105. Field Course.—(Prerequisite, 1a or 1b). Offered in the summer session. Intended as preparatory for advanced work in geology, and as a basis for the teaching of geology and physical geography. The field work will consist of the making of a topographic map of a small area in the Wind River Mountains, mapping the areal geology, describing the formations, collecting in a systematic way from each formation, and reporting on the structural geology, physiography, and economic products. A more general study will be made of a large area in western Wyoming. Special topics are assigned to graduate students, and this work may form the basis for master's or doctor's theses. (8). Mr. Branson.

106b. Petrology.—(Prerequisites, 4b, 5a, Inorganic Chemistry, and General Physics). The principles of optics as applied to the polarizing microscope and the optical properties of the rock forming minerals are first studied. This is followed by microscopic and megascopic study of the various rock groups. (5). Mr. Tarr.

107a. **Field Geology.**—A course in geological surveying carried on in the vicinity of Columbia. Two afternoons in each week and three whole days (Saturdays) will be spent in the field during the progress of the field work. The field work will be carried on from September to December 1. The reports and maps will be prepared between December 1 and the close of the semester. It is offered as a course in field training for Civil Engineers, Topographers, Geologists, and Soil Surveyors or students who intend to go into work of this kind. Candidates for this course must have had courses 1a or 1b. (3). Mr. Marbut.

108b. **Soils of the United States.**—(Prerequisite course 2a, 6a, 1a or 1b, in the College of Arts and Sciences.) A study of nature, distribution and adaptabilities of the soils of the United States. Candidates for this course must have had one of the above courses. (3). Mr. Marbut.

200a. **Principles of Ore Deposits.**—(Prerequisites, 4b, 5a, 100a, 101b Chemistry 6a, and General Physics). A consideration of the origin of the deposits of the metals and non-metallic minerals, the principles and chemistry of their deposition, and their metamorphism. (3 or 4). Mr. Tarr.

202a. **Stratigraphic Geology.**—(Prerequisites, 103a and 104b). Lectures, map work, and field work on the stratigraphy of North America, with more intensive study of a limited area. (5). Mr. Branson.

203b. **Paleontology.**—(Prerequisite, 104b. Zoology of Invertebrates and Comparative Anatomy of Vertebrates are desirable antecedents). A somewhat detailed study of a few of the main groups of invertebrates or vertebrates with reference to their evolution and distribution previous to the present period. The content of the course will be varied to suit the needs of individual students. (5). Mr. Branson.

205. **Research Work.**—Offered by members of the department in their respective lines.

MATHEMATICS.

It is especially recommended that students intending to specialize in Mathematics should take courses in French and German in the preliminary work; but an extensive knowledge of the literature of those languages is not necessary.

The courses past course 100 are open only to those who have

secured the permission of the instructor in the course. Courses past course 250 are offered for special work by rather advanced students and are given only when specially announced.

100. Second Course in Calculus.—This course should be elected by all who have reasonably succeeded in elementary calculus, who desire to continue mathematical work. It will deal with questions necessarily omitted or treated hurriedly in the first course on calculus and will cover approximately the ground indicated by Goursat-Hedrick, *Course in Mathematical Analysis*, including also introductory lectures on sets of points. (3). Mr. Hedrick.

110a and 115b. The Historical Development of Mathematics.—This course is designed as an introduction to higher courses in mathematics, and as a comprehensive view of the whole subject for students who will not pursue mathematics farther. It will consider the main problems, the points of view, and the methods, of the principal higher divisions of mathematics, together with an intensive study of typical topics selected from a wide range. The treatment of any topic will be accompanied by a consideration of the larger significant facts in the history of its development. While the two courses 110a and 115b form essentially one course, the latter is so arranged that it may be elected independently of 110a by suitably prepared students with special permission. (3). Mr. Ames.

120a and 125b. Differential Equations and Their Applications.—A short time will be spent in the consideration of differential equations and in the formal solution of some of the simpler types. This will be followed by the careful study and solution of certain problems of geometry, physics, and other sciences in which differential equations occur. Course 125b is arranged to permit of its election independent of 120a by specially prepared students with special permission. (3). Mr. Dunkel and Mr. Ingold.

160a or b. Probabilities and Statistics.—This course will cover the fundamental elementary topics in the theory of probabilities, including the theory of least squares; and it will contain a variety of applications of the theory, such as life insurance, statistics, and scientific observations. While the calculus is a desirable preparation, students are permitted to enter without it by special permission upon showing their ability to profit from the course. (2). Mr. Kellogg.

200a or b. Seminary.—The members of the staff will conduct

work in reading and research in private with students prepared for such work. The nature and amount of the work done may vary materially. The course may be elected repeatedly in different semesters for different work, and for any number of hours sanctioned by the instructor.

205a or b. **Modern Algebra.**—The nature of the course is best indicated by such reference books as Weber's *Algebra*, and Bocher's *Higher Algebra*. Alternate years. Given 1911-12. (3). Mr. Westfall.

210a or b. **Differential Geometry.**—Lectures. Introduction to the theory of modern differential geometry. Reference books: Joachimstahl; Niewenglowski; Bianchi; Darboux. Naturally follows either course 100 or 115b. Alternate years. (Given 1911-12.) (3). Mr. Ingold.

215a or b. **Projective Geometry.**—Lectures, supplemented by reading. Reference books; Emch, *Projective Geometry*; Reye, *Geometrie der Lage*; Scott, *Modern Geometry*, Alternate years. (Offered 1912-13.) (3).

220a or b. **Fourier's Series and Allied Series.**—Introduction to mathematical physics. Lectures, supplemented by reading. Alternate years. (Given in 1911-12.) (3). Mr. Kellogg.

225a or b. **Potential Function.**—This course forms a natural continuation of 220a. Lectures, supplemented by reading. Alternate years. (Offered 1912-1913.) (3). Mr. Kellogg.

230. **Theory of Functions of Real Variables.**—Higher Analysis, including the most important features of mathematical analysis, in a comprehensive but elementary manner. Lectures, supplemented by reading. Alternate years. (Given in 1911-12.) (3). Mr. Hedrick.

240. **Theory of Functions of Complex Variables.**—A general course, covering the theories of Riemann, Cauchy, and Weierstrass, in their elementary phases. Theory of Functions of a Complex Variable; Elliptic Functions. Alternate years. (Offered in 1912-13.) (3). Mr. Hedrick.

260a or b. **Theory of Groups, with Applications to Galois' Theory and Lie's Theory.**—Lectures. (3). Mr. Ames.

280a or b. **Calculus of Variations.**—A course on the theory of Maxima and Minima for functions defined on a general range.

References to Hadamard, Bolza and other treatises. Alternate years. (Given 1911-12). (3). Mr. Westfall.

Among other courses, the following are offered occasionally, when the needs of the student seem to warrant:

250a or b. **Theory of Differential Equations.**

265a or b. **Theory of Numbers.**—(3).

270a or b. **Analytical Mechanics.**—(3).

275. **Partial Differential Equations of Mathematical Physics.**—(3).

Mathematical Clubs.—The students of the department conduct, for the discussion of mathematical topics, a club, to which all persons interested are eligible. The members of the staff of the department hold regular meetings for the discussion of current literature and of recent research, which are open also to qualified graduate students.

For other courses on mathematical topics, see, also, the announcements of Physics and of the School of Engineering.

PHYSICS.

Students intending to specialize in Physics should also take Mathematics. Even in the less mathematical courses some knowledge of Calculus is of great advantage.

104a. **Electrical Measurements.**—Two lectures and three laboratory periods. In the lectures is given an introduction to the mathematical theory of electricity and electrical measurements. The laboratory work consists of such work as comparisons of resistances by Kelvin double bridge and Carey Foster methods; determination of temperature coefficients; comparison of electromotive forces of cells; various uses of the potentiometer; comparison and absolute measurement of capacities; measurement of the coefficient of self and mutual induction; calibration of ammeters and voltmeters; photometric work with incandescent lamps. (5). Mr. Stewart, Mr. Rentschler, Mr. Wheelock.

108a and 108b. **Electricity and Light.**—This course is entirely laboratory work and must be preceded by either course 1 or 3. It offers training in the more exact methods of laboratory measurements. The work is entirely individual so that the time may be spent either on optical or electrical problems. In Light the

work is quantitative, consisting of measurements of wave lengths by interference methods, Fresnel mirrors, interferometers, etc.; determinations of refractive indices; study of resolving power of optical instruments and similar problems. In electricity the work is the same as the laboratory work of course 104a. (1), (2) or (3). Mr. Stewart and Mr. Reese.

106. **Mechanics and Heat.**—A laboratory course similar to 108. (1) or (2). Mr. Reese.

109. **Advanced Work in General Physics.**—This course, largely laboratory work, will be adapted to meet the needs and attainments of individual students. A student may be assigned a definite problem, the literature of which must be studied and the experimental work performed with the care of original research. (2) or (4). Mr. Stewart, Mr. Reese.

110b. **Electricity and Magnetism.**—This course largely descriptive is planned to meet the needs of students who are not prepared to take the more mathematical work of 207. Students desiring laboratory work in connection with this course can elect one or two hours of course 108. Lectures and recitations. (3). Mr. Rentschler.

112a **Heat.**—(3).

112b. **Light.**—(3).

These courses are open to those who have completed course 3 or 4 or its equivalent. This work is recommended to those who either intend to teach in high schools or desire work more general in character and less mathematical than courses 205, 206, 207 and 215. (3). Mr. Reese.

117b. **Spectroscopy.**—A practical course in the use of various forms of spectrosopes and the applications to physical problems. Open to those who have had course 1 or 3. (2). Mr. Reese.

Courses 205, 206, 207, and 215 are courses in Mathematical Physics.

205. **Theory of Light.**—Based on Drude's Theory of Optics. Special attention is given to the electromagnetic theory. Lectures and recitations. (3). Mr. Stewart.

207. **Theory of Electricity and Magnetism.**—Lectures and recitations. (3). Mr. Stewart.

Courses 205 and 207 will not both be given in the same year.

206. **Theory of Heat.**—Lectures and recitations. (3). Mr. Reese.

215. **Dynamics.**—Introduction to the fundamental principles of Mathematical Physics. (3). Mr. Reese.

221b. **Electrical Waves.**—Theory and applications. (2). Mr. Stewart.

210. **Seminary.**—Critical reading and discussion of current research work in Physics. A colloquium in which all members of the teaching staff of the department, and students of sufficient attainments take part. (1).

211. **Research Work.**—*Hours to be arranged.* Mr. Stewart, Mr. Reese, Mr. Rentschler.

GROUP OF BIOLOGICAL SCIENCES.

ANATOMY AND HISTOLOGY.

105b. **Topographic Anatomy.**—A study of the topography of the various organs by means of serial sections through the body. Open only to students who have completed the undergraduate courses in Anatomy. Laboratory. (2). Mr. Jackson.

108. **Human Embryology.**—Based upon a study of human and other mammalian embryos, especial attention being paid to organogenesis and histogenesis. The elementary courses in Anatomy, Histology, and Embryology are necessary as preparation for this course. *Hours to be arranged.* Mr. Jackson.

206. **Advanced Anatomy.**—Advanced work in Anatomy or Histology. A seminary, (which may be taken separately if desired), is held once a week. *Hours to be arranged.* Mr. Jackson.

207. **Investigation.**—Problems of original research will be assigned in Anatomy or Histology. A reading knowledge of French and German is required. *Hours to be arranged.* Mr. Jackson.

BOTANY.

100. **Plant Physiology.**—Lectures and laboratory work on the physiology of the common cultivated plants, covering such topics as absorption, transpiration, synthesis of carbohydrates and proteins, digestion, translocation, respiration, growth, reproduction,

and the reaction of plants to stimuli as light, gravity, etc. (3). Mr. Reed.

102b. **Physiology of the Fungi.**—Lectures and laboratory work on the physiology of the fungi. Special emphasis will be placed on the nutrition of fungi, including methods of isolation and pure culture. Attention is also given to the methods of infection, effect on the host plant, etc., of some of the parasitic forms as rusts, smuts, and mildews. This course should be preceded by 2a. (3). Mr. Reed.

103b. **Soil Bacteriology.**—(Prerequisite Botany 3). A course dealing with the relation of micro-organisms to soil problems. Nitrogen fixation, nitrification, denitrification and the effect of various factors on the number and kinds of organisms in the soil are considered. (3). Mr. Gainey.

104a. **Histological Methods.**—The student will learn the methods used in the preparation and preservation of class material in bulk, and in fixing, sectioning and staining of sections for microscopical study. (2). Mr. Durand.

105. **Comparative Morphology and Embryology.**—A detailed study of the structure and life history of selected representatives of the great groups of green plants. Special attention will be given to tracing the development and homologies of sterile, sporogenous and reproductive parts such as the formation of spores, and gametes, fertilization, the development of the embryo, etc. The nuclear changes accompanying fertilization and sporogenesis will be followed. This course may profitably be preceded or accompanied by courses 4b, 5a, 6b, and 104a. Lectures and Laboratory. (3). Mr. Durand.

106a. **Principles of Plant Breeding.**—A discussion of the fundamental principles of plant breeding, including parthenogenesis, hybridization, Mendelian phenomena, etc. Lectures and reports on assigned readings. (2). Mr. Reed.

108b. **Diseases of Forest Trees.**—(Prerequisite Botany 2a). The course takes up a study of the fungous diseases of forest trees, the fungi which cause decay in timber and the methods of timber treatment. (3). Mr. Reed.

200. **Seminar.**—Special subjects of botanical research will be taken up and discussed. For the session of 1912-13 the subject will be the recent botanical work on heredity. In addition the re-

sults of investigation carried out in the department will be presented. A reading knowledge of French and German is essential. (1). Mr. Reed.

201. **Research.**—Students who have had adequate preparation will be assigned some special problem for investigation. A reading knowledge of French and German is essential. Credit and hours to be arranged. Mr. Reed, Mr. Durand.

PATHOLOGY.

201. **Advanced Pathology.**—(Prerequisite, Pathological Bacteriology 102a and Pathology 103b.) Choice may be made of either Medical Bacteriology or Pathological Anatomy. The amount and character of the work will depend upon the needs and qualifications of the student. In connection, opportunity will be afforded for practical experience in the handling of all kinds of morbid material. *Hours to be arranged.* Mr. Dolley.

202. **Research.**—Opportunity is offered to students sufficiently prepared for original investigation of unsolved problems in the fields of Bacteriology, Pathology and Pathological Physiology. A reading knowledge of German is required and one of French is recommended. A seminary is held once a week. Mr. Dolley.

203. **Normal and Abnormal Neuro-cytology.**—The application of the general principles and theories of biology to the nerve cell in health and disease. The work will necessarily consist largely of original investigation and will be adjusted to the training of the student. *Hours to be arranged.* Mr. Dolley.

PHYSIOLOGY.

102a. **General Physiological Chemistry.**—The physiology and physiological chemistry of the proteins; of muscle, nerve and connective tissues; of the cell; of blood, secretion, digestion, absorption, intermediary metabolism, and excretions; of nutrition, heat production, and heat regulation. A metabolism experiment with a quantitative examination of the urine is required. (4). Mr. Steel.

103a. **Experimental Physiology.**—The physiology of muscle and nerve, circulation, respiration, nervous system, and sense organs. (6).

The laboratory work of this course is open, for three hours credit, to students who present 111b supported by sufficient col-

lateral work in biological or physical science. (3). Mr. Greene, Mr. Skaer.

104b. **Advanced Physiological Chemistry.**—A course supplementing and extending course 102a. The preparation and chemistry of the proteins; a qualitative and quantitative study of the tissues and secretions, of enzymes, of putrefaction and putrefactive products; analyses of typical foods, and the detection of food preservatives and adulterants. The prosecution of a short investigation and formal report on the same are required. (4). Mr. Steel.

105b. **Pharmacology.**—This course presents the physiological action of drugs from the experimental point of view. The demonstrations are made on man and the lower animals. (4). Mr. Greene, Mr. Skaer.

107a or 107b. **Toxicology.**—Prerequisites 104b or 105b. (2) or (3). Mr. Steel.

208. **Journal Club.**—(1). Mr. Greene.

209a. **The Pharmacology of the Circulatory System.**—(3). Mr. Greene.

210. **Advanced Physiology.**—Advanced courses in Physiology, Physiological Chemistry and Pharmacology. Individual problems will be assigned to students of sufficient preparation. *Hours to be arranged.* Mr. Greene, Mr. Steel.

211. **Investigation.**—Opportunity is offered for research into questions of current physiological interest. Mr. Greene, Mr. Steel.

ZOOLOGY.

100b. **Embryology of Vertebrates.**—The course is designed to lay the foundation of vertebrate embryology. Successive stages in the development of the frog, the chick and the pig are studied from preparations of entire embryos and from serial sections. These observations are used as a basis of comparison for the study of human embryology. (3). Mr. Lefevre, Mr. Tannreuther.

101b. **Comparative Embryology of Invertebrates.**—A comparative study of the development of representative forms from the principal phyla of the invertebrates, including a consideration of general phylogenetic and morphological problems. (3). Mr. Curtis.

102b. **Cytology.**—A study of the cell, with special reference to problems of development and inheritance. Cytological technique. (3). Mr. Lefevre.

103a. **Experimental Zoology.**—A course in zoology, with special reference to the physiological aspect, and including: influence of environment on structure and on life-cycles, response to stimuli, and experiments on growth, regeneration and development. (3). (Not to be given in 1912-13.)

104a. **Genetics and Evolution.**—A course of lectures dealing with the experimental study of genetics and its relation to the problems of evolution. Emphasis is laid on the phenomena of Mendelian inheritance and the cytological basis of heredity. (2). Mr. Lefevre.

200. **Research.**—Special investigation of unsolved problems of zoology, in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is essential. *Hours to be arranged in accordance with the requirements of individual students.*

201. **Seminary.**—Meetings at which subjects of zoological investigation are reported and discussed by instructors and students. Each student is required to give at least four lectures during the year, and experience is thus gained in presenting, in the form of lectures, the results of reading and research. For the session of 1912-13 the following subjects will receive special attention in the work of the Seminary: genetics, and the behavior of organisms. A reading knowledge of French and German is essential. (1).

GROUP OF AGRICULTURE.

AGRICULTURAL CHEMISTRY.

102. **Advanced Agricultural Chemistry.**—This course is a continuation of the regular undergraduate course in agricultural chemistry, which is required of all undergraduate students in agriculture. A critical study of methods in use in the chemical laboratories of the experiment station will be made, including an examination of foods and feeding stuffs for adulteration, etc. This work is planned primarily for those who wish to fit themselves for the work of experiment station and city food laboratories. Elective, three to five periods per week, including one lecture or recitation each week. *Hours to be arranged.* Mr. Trowbridge, Mr. Moulton and Mr. Haigh.

201. **Seminar.**—(1). Mr. Trowbridge.

202. **Research.**—This course can be elected either as major or minor for advanced degrees, and may include a thesis showing the results of the investigations. The chemical laboratories offer exceptional facilities for research. Subjects may be selected in (a) animal nutrition, (b) composition of animal fats as affected by feeding, age, breed, etc., (c) the composition of meats, feeding stuffs, fertilizers, soils, etc., (d) the chemical problems involved in the dairy industries, (e) the distribution of phosphorus in the animal organism with special reference to the separation of phosphorous compounds, (f) chemical problems involved in the enforcement of State and National pure food laws, (g) the separation of the proteins of flesh and study of their hydrolytic cleavage products. Mr. Trowbridge, Mr. Moulton, Mr. Haigh.

203a. **Chemistry of the Proteins.**—A critical study of the composition and classification and of the decomposition products of the meat and vegetable proteins. Lectures and recitations. (3). Mr. Trowbridge.

AGRONOMY.

200b. **Soil Investigations.**—A study of methods of soil investigation and of special soil problems. Particular attention is given to methods and results of soil investigations in the United States and Europe. One lecture and two laboratory periods a week. (3). Mr. Miller, Mr. LeClair.

201. **Special Investigations.**—Original investigations in soils, crops, or farm engineering. The special work undertaken is determined by the preparation and the needs of the student. *Hours to be arranged.* Mr. Miller.

202. **Seminar.**—Discussion of various phases of agronomic investigations. Papers on assigned topics are presented for discussion. A reading knowledge of French and German is recommended. (1). Mr. Miller.

ANIMAL HUSBANDRY.

112. **Seminar.**—Special investigation bearing on selected lines in Animal Husbandry. The preparation and presentation of papers for discussion by the class. **Twice a week.** Elective. Mr. Mumford, Mr. Trowbridge, Mr. Allison.

113. **Experimental Feeding.**—Original investigations of important problems in feeding cattle, sheep and swine. This course is intended to give experience in methods of experimental work and to make the student familiar with the most approved methods of investigation. Elective. Mr. Trowbridge, Mr. Allison.

114. **Research in Animal Husbandry.**—Advanced studies of special phases of Animal Production. Recommended to students who desire more thorough training in the production of cattle, horses, sheep or swine, or who may wish to make a more careful study of the fundamental principles of Animal Husbandry. Mr. Trowbridge, Mr. Allison, Mr. Mumford.

215. **Animal Breeding.**—Research in special subjects bearing on the inheritance and development of characters in the domestic animals. Mr. Mumford.

216. **Zoometry.**—Special investigation of the relations of form and function in the domestic animals. Mr. Trowbridge.

217. **Research in Stock Farm Management.**—Investigations of the principles governing successful systems of stock farm management. Special studies of highly efficient stock farms. Mr. Trowbridge, Mr. Allison, Mr. Mumford.

DAIRY HUSBANDRY.

100b. **Milk Production.**—The breeds of dairy cattle; selection, breeding and development of a dairy herd; care and management of dairy cattle; feeding for milk production; production of certified and market milk; milk for butter-making and cheese-making; utilization of by-products of the dairy. Mr. Eckles.

201. **Seminar.**—The object of this course is to train the student to do independent work, and to develop the spirit of research. It consists of special investigation and study along selected lines of research with review and discussions of recent work. Each student presents papers on selected topics and reports on recent scientific investigations and on current literature of the subject. Mr. Eckles.

202. **Research in Dairy Husbandry.**—A large herd of highly developed dairy cattle representing four breeds make it possible to offer facilities for study and investigation on a variety of subjects pertaining to milk production and the care and management of dairy cattle. Students interested in this line are allowed to

carry out certain experiments with the dairy animals and in some cases to assist in lines of investigation under way in the Experiment Station. Mr. Eckles.

203. Special Investigations in Composition of Milk.—An extended series of investigations is under way regarding the factors that influence the composition of normal milk. A certain number of students are allowed to assist in these investigations and to undertake small problems independently. Mr. Palmer.

204. Dairy Bacteriology.—This will be laboratory investigation of certain problems of bacteriology in relation to Dairying, the object being chiefly to give training in methods of research in this line. The work will be adapted largely to the individual student. Mr. Eckles.

205. Dairy Manufactures.—Opportunity and facilities are given to study and investigate problems in butter-making, cheese-making and other lines of Dairy Manufactures. Mr. Rinkle.

ENTOMOLOGY.

110b. Advanced Economic Entomology and Insectary Methods.—Lectures, laboratory and field work. Open only to students who have taken course 1b or 2a. Credit two hours. *Two afternoons a week by appointment.* Mr. Haseman.

111a. Morphology, Histology and Development of Insects.—Open only to students who have taken courses 1b, 4a, and 5b. Credit two hours. Lectures and demonstrations. Mr. Haseman.

200. Research.—Opportunity is offered for original investigation of Economic, Morphologic, and Systematic problems presented by our local insects fauna. Mr. Haseman.

FARM MANAGEMENT.

112b. Farm Administration.—The economical and properly balanced use of the material gathered in the 10b course. Methods of, and practice in, studying farm conditions to determine farm problems; the laying out of the farm, including location and kind of buildings, fences, and all permanent improvements; systems of crop and stock management with plans showing how these may be balanced and worked into a successful system of business farming. Field trips. 2 lectures and 1 laboratory. (3). Mr. Doane.

114. **Seminary.**—Selected literature and special field investigations of farm management problems, these to be used as the basis for original outlines, and detailed plans for improving systems of farming. Mr. Doane; Mr. Johnson.

201. **Investigation of Types of Farming.**—Field investigations of the different types of farming occurring in a given region, including careful and detailed study of farm practices and incomes. Thesis required. Mr. Doane; Mr. Johnson.

202. **Investigation of Cost of Production and the Distribution of Labor.**—Field investigations of the comparative cost of producing farm products and the distribution of labor on Missouri farms. Thesis required. Mr. Doane; Mr. Johnson.

207. **Investigation of Systems of Farm or Rural Practices and Organizations.**—Original research covering present farm practices and their practical application. Also a study of rural institutions or organizations that directly affect or are related to farm management. Thesis required. Mr. Doane; Mr. Johnson.

HORTICULTURE. .

111. **Advanced Pomology.**—A study of the principal species, types and varieties of cultivated fruits and their related forms, together with a consideration of their variations, modifications and adaptations under culture. The living plant collection and preserved specimens on the Horticultural Grounds afford material for the work. *Hours by appointment.* Mr. Whitten.

113. **Olericulture.**—Exhaustive studies of special groups, species, types and varieties of garden vegetables, together with their cultural requirements and adaptations to special purposes. Mr. Whitten, Mr. Howard.

114. **Ornamental Plants.**—Lectures, laboratory, and assigned readings on the identification and classification of ornamental plants used in Landscape Gardening. The making of herberia. Prerequisite, Botany 4b; Horticulture 8b. (3). Mr. Major.

115a. **Elementary Landscape Designs.**—Draughting room exercises. Prerequisite, Horticulture 8b, 114. (3). Mr. Major.

215. **Special Investigation.**—This course is intended for graduates and advanced students. Special topics for investigation will be assigned. *Hours by appointment.* Mr. Whitten, Mr. Howard, Mr. Chandler and Mr. Major.

VETERINARY SCIENCE.

201. **Topographic Veterinary Anatomy.**—A study of the topographic anatomy of the horse, ox and pig by means of serial cross-sections of preserved cadavers, supplemented by a study of anatomical surface points on the living subject.

This course is designed to meet the needs of advanced students who intend to specialize in Animal Husbandry along the lines of "Stock Judging" and "Meat Production." Course 1a prerequisite. (3). Mr. Connaway.

202. **Contagious, Infectious and Parasitic Diseases of Farm Animals.**—In this course an effort is made to present as many clinical cases as possible, in order that the student may gain a practical knowledge of the clinical features as they are encountered in field experience. Experimental inoculations supplement the clinical study. Autopsies are made and the gross and microscopic lesions studied. The specific causes (bacteria and other micro-parasites and macro-parasites), where known, are isolated and studied. Such ground relating to this group of diseases as has been well covered in the minor course 3a is not repeated in this course. Text and reference books: Friedberger and Froehner's *Veterinary Pathology*, Vol. II, "Infective Diseases;" Law's *Vet. Med.* Vol. IV; Ostertag and Wilcox's "Meat Inspection;" Neumann's "Parasites and Parasitic Diseases;" Nocard and Loclainche's "Les Maladies Microbiennes des Animaux;" Kitt's "Bakterien Kunde." Special Bulletins and Veterinary Journals. Lectures, assigned reading, clinics and laboratory work. (3). Mr. Connaway.

203. **Investigation.**—Students who have suitable preparation will have an opportunity to assist in the Experiment Station work. Studies on immunity in relation to hog cholera will continue to be the principal line of investigation during the coming session. (3) to (6). Mr. Connaway.

THEORY AND PRACTICE OF ART.

105. **Pictorial Composition.**—(Prerequisite course 4 or courses 2a (2b) and 3. Exception may be made to students possessing technique of photography). Study and practice in the making of pictures. (2). Mr. Ankeney.

106. **Painting.**—(Prerequisite, course 4 while course 3 is advised in addition). Style, theory and methods of various schools and movements. Lectures, study of examples and reading. Ex-

perimental practice in painting from still life and life with work in original composition. (3). Mr. Ankeney.

107. **Tone.**—An advanced painting course. A close analysis of the composition and relation of tones (value, color quality, intensity), with the equivalents in pigments in interpreting both indoor and outdoor subjects. Two periods a week will be given to work directly under the instructor, in addition to which the student will be expected to paint a great deal alone, bringing in the work for criticism. (3-5). Mr. Ankeney.

208. **Seminary.**—A research course in the processes of the Old Masters with the adaptation of their traditions to modern work. Mr. Ankeney.

HISTORY OF ART.

105. **History of Modern Belgian, Modern Dutch and American Painting.**—Lectures and collateral reading. Critical study of representative pictures by means of lantern slides, photographs, and other reproductions. (2). Mr. Pickard.

111. **History of Renaissance Painting.**—*First semester:* Italian Painting. *Second semester:* Painting of the Netherlands and of Germany. This course should be preceded or accompanied by European History (History 1a). With Italian Painting, European Culture and Civilization (History 150a) is also earnestly recommended. (3). Mr. Pickard.

113. **Masterpieces of Architecture, Sculpture, and Painting of Classical, Renaissance and Modern Times.**—Lectures fully illustrated with the stereopticon. This course aims to show the historical development of art by the discussion of some of the finest examples in each of the three divisions mentioned. (1). Mr. Pickard.

216. **Seminary in the History of Art.**—*Hours and work to be assigned.* Mr. Pickard.

As supplementary to all courses offered in the history of Painting and of Sculpture, Introduction to Art (Theory and Practice of Art) is recommended.

For courses in Classical Archaeology and Art see page 9.

OFFICERS OF INSTRUCTION AND ADMINISTRATION GRADUATE SCHOOL.

- ALBERT ROSS HILL, A. B., Ph. D., LL. D.,
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- SIDNEY CALVERT, B. S., A. M.,
Professor of Organic Chemistry.
- WILLIAM JEPHTHA CALVERT, A. B., M. D.,
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- WERRETT WALLACE CHARTERS, A. B., Ph. M., Ph. D.,
Professor of Theory of Teaching, Dean of the Faculty of Education, and Director of the Summer Session.
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Professor of Economics.
- LUTHUR MARION DEFOE, A. B.,
Professor of Mechanics in Engineering, and Tutor to the University.
- DAVID HOUGH DOLLEY, A. B., A. M., M. D.,
Professor of Pathology and Bacteriology.
- CLARENCE HENRY ECKLES, B. S. in Agr., M. Sc.,
Professor of Dairy Husbandry.

- JOSEPH DOLIVER ELLIFF, A. B., A. M.,
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Professor of Germanic Languages.
- WALTER LAFAYETTE HOWARD, B. Agr., B. S., M. S., Ph. D.,
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- CLARENCE MARTIN JACKSON, B. S., M. S., M. D.,
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of Medicine.
- JOHN CARLETON JONES, A. B., A. M., Ph. D., LL. D.,
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- OLIVER DIMON KELLOGG, A. B., A. M., Ph. D.,
Professor of Mathematics.
- GEORGE LEFEVRE, A. B., Ph. D.,
Professor of Zoology, and Curator of the Zoological Museum.
- ISIDOR LOEB, B. S., LL. B., Ph. D.,
Professor of Political Science and Public Law, and Dean of
the University Faculty.
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Professor of Greek Language and Literature.
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Geological Museum.
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Professor of Classical Archaeology and History of Art, and Curator of the Museums of Art and of Classical Archaeology.
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- OSCAR MILTON STEWART, Ph. B., Ph. D.,
Professor of Physics.
- NORMAN MACLAREN TRENHOLME, A. B., A. M., Ph. D.,
Professor of History.
- EDWIN A. TROWBRIDGE, B. S., in Agr.,
Professor of Animal Husbandry.
- PERRY FOX TROWBRIDGE, Ph. B., A. M., Ph. D.,
Professor of Agricultural Chemistry, and Chemist to the Agricultural Experiment Station.
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Lecturer in Economics.
- JONAS VILES, A. B., A. M., Ph. D.,
Professor of American History.
- JOHN CHARLES WHITTEN, B. S., Ph. D.,
Professor of Horticulture, Horticulturist to the Experiment Station, and Tutor to the University.
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Assistant Professor of Educational Administration, and Private Secretary to the President.
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Assistant Professor of Animal Husbandry.
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Assistant Professor of Mathematics.
- JOHN SITES ANKENNEY, A. B.,
Assistant Professor of Theory and Practice of Art.

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Assistant Professor of Astronomy, and Director of the Laws-
Observatory.
- SPURGEON BELL, B. S.,
Assistant Professor of Economics, and Consulting Accountant
of the University.
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Assistant Professor of Horticulture.
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Assistant Professor of Farm Management.
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Acting Assistant Professor of Anatomy.
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ent of Grounds.
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Ph. D.,
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Assistant Professor of Romance Languages.
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Assistant Professor of Sociology.

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Instructor in Analytical Chemistry.
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Instructor in Entomology, and Entomologist to the Agricultural Experiment Station.

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Instructor in Astronomy.

LOUIS INGOLD, A. B., A. M., Ph. D.,
Instructor in Mathematics.

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Instructor in Chemistry.

LAWRENCE MARSDEN PRICE, A. B., A. M., Ph. D.,
Instructor in German.

WILLIAM HENRY PYLE, A. B., Ph. D.,
Instructor in Educational Psychology.

JAMES WALTER RANKIN, A. B., A. M., Ph. D.,
Instructor in English.

ERNEST HENRY RIEDEL, A. B., A. M., Ph. D.,
Instructor in Latin.

LORIN GEORGE RINKLE, B. S., M. S.,
Instructor in Dairy Husbandry.

FRANK FLETCHER STEPHENS, Ph. B., Ph. M., Ph. D.,
Instructor in American History.

GEORGE WASHINGTON TANNREUTHER, A.B., A.M., Ph.D.,
Instructor in Zoology.

WILLIAM ARTHUR TARR, S. B., S. B. in M. E.,
Instructor in Geology and Mineralogy.

JACOB WARSHAW, A. B., A. M.,
Instructor in Romance Languages.

FRANK ELBERT WHELOCK, A. B., Ph. D.,
Instructor in Physics.

JESSE ERWIN WRENCH, A. B.,
Instructor in European History.

UNIVERSITY CALENDAR.**AT COLUMBIA****SUMMER SESSION****1912**

| | |
|------------|---------------------------------------|
| June 14, | Friday, Registration, Summer Session. |
| June 15, | Saturday, Organization of Classes. |
| July 4, | Thursday, Holiday. |
| August 14, | Wednesday, Lectures Close. |
| August 15, | Thursday |
| August 16, | Friday |
| | } Examinations. |

FIRST SEMESTER

| | |
|------------------------|---|
| September, 16, 17, 18, | Monday, Tuesday, and Wednesday, Entrance Examinations and Registration. |
| September 19, | Thursday, at 8 A. M. Class Work in all Divisions Begins. |
| September 19, | Thursday, at 10 A. M. Opening Convocation. |
| November 28, | Thursday, Thanksgiving Holiday. |
| December 10, | Tuesday, Annual Meeting of Curators. |
| December 20, | Friday at 4 P. M. to |
| 1913 | } Christmas Holidays. |
| January 6, | Monday, at 8 A. M. |
| February 1, | Saturday, to |
| February 8, | Saturday |
| | } Mid-Year Examinations. |

SECOND SEMESTER

| | |
|------------------|--|
| February 10, 11, | Monday and Tuesday, Registration, Second Semester. |
| February 12, | Wednesday, at 8 A. M. Opening Convocation. |
| February 13, | |
| March 20, | Thursday, at 4 P. M. to |
| March 26, | Wednesday, at 8 A. M. |
| April 3, | Thursday, Quarterly Meeting of Curators. |
| May 31, | Saturday to |
| June 7, | Saturday |
| June 8, | Sunday, Baccalaureate Sermon. |
| June 9, | Monday, Class Day. |
| June 9, 10, 11, | Monday, Tuesday, and Wednesday, Entrance Examinations. |
| June 10, | Tuesday, Phi Beta Kappa Day. |
| June 11, | Wednesday, Commencement Day. |
| June 11, | Wednesday, Semi-Annual Meeting of Curators. |

INFORMATION ABOUT THE UNIVERSITY.

GENERAL STATEMENT.

The fundamental aim of the University of Missouri is the development of the highest and most efficient type of citizen. For the purpose of attaining its aim, the University furnishes ample facilities for liberal education and for thorough professional training. The University is a part of the public educational system of the State.

ORGANIZATION.

The work of the University is now carried on in the following Colleges and Schools:

- College of Arts and Science
- College of Agriculture
- School of Education
- School of Law
- School of Journalism
- School of Medicine
- School of Engineering
- School of Mines and Metallurgy
- Graduate School

All of these divisions are at Columbia with the exception of the School of Mines and Metallurgy, which is located at Rolla. In addition, emphasis is given particular lines of work by the establishment of minor divisions, the chief of which are the Extension Division, the Agricultural Experiment Station, the Engineering Experiment Station, and the Military Department.

LOCATION.

The University of Missouri is located at Columbia, a town situated half way between St. Louis and Kansas City near the center of the State. It is reached by the Wabash, and Missouri, Kansas and Texas Railways. Columbia is a progressive and prosperous town having doubled its population in the last few years. It has nearly twenty miles of paved streets.

Columbia may be characterized as a town of schools, homes and churches, with enough of industrialism to make it efficient. It offers the conveniences of a larger city without the counter attractions. The student is a predominant factor in Columbia. He is one to three in numbers. The population of the town is 10,000.

EQUIPMENT.

The University grounds cover over seven hundred acres. The main divisions are in the Quadrangle, the Horticultural Grounds, the Physical Education Grounds, and the Agricultural College Farm.

The following University buildings are located at Columbia: Academic Hall; Laws Observatory; separate buildings for Chemistry, Zoology and Geology; Engineering; Manual Arts; three power houses; Medical Laboratory Building; Parker Memorial Hospital including the Busch Clinic; Agricultural Building; Horticultural Building; Green Houses; Live-Stock Judging, Dairy, Farm Machinery, and Veterinary Buildings, and the Agricultural Farm Barns and Buildings; Switzler Hall, for the School of Journalism; Benton and Lathrop Hall, dormitories for men; Read Hall, the dormitory for women; Rothwell Gymnasium; the houses for the President of the University and the Dean of the College of Agriculture; the High School, and the Elementary School Buildings, used for practice schools in the School of Education.

FOR FURTHER INFORMATION.

For further information in regard to the Graduate School of the University, address

CHAIRMAN OF GRADUATE COMMITTEE,
University of Missouri,
Columbia, Missouri.

Full information regarding the University is given in the catalogue which will be sent on request without charge. For this or special bulletins of the College of Arts and Science, College of Agriculture, School of Education, School of Law, School of Medicine, School of Engineering, the School of Journalism, and the Graduate School, write to

DEAN OF THE UNIVERSITY FACULTY,
University of Missouri,
Columbia, Missouri.

THE UNIVERSITY OF MISSOURI BULLETIN

GENERAL SERIES

FOR 1912 ~~OF THE~~ VOLUME 13

EDITED BY

JOSEPH E. CHASNOFF,
University Publisher

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| Number 1, January | Summer Session |
| Number 2, February | "Every Day at The University" |
| Number 3, March | Graduate School |
| Number 4, April | Catalogue |
| Number 5, May | School of Education |
| Number 6, June | School of Medicine |
| Number 7, July | School of Law |
| Number 8, August | School of Journalism |
| Number 9, September | School of Engineering |
| Number 10, October | College of Agriculture |
| Number 11, November | College of Agriculture |
| Number 12, December | Second Semester Courses |

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VOLUME 14 NUMBER 3

ANNOUNCEMENT
OF THE
GRADUATE SCHOOL
1913-14



UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
March, 1913

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UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
March, 1913

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ANNOUNCEMENT OF GRADUATE SCHOOL

GENERAL STATEMENT

Admission:

Graduates of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities, and (in exceptional cases by special permission of the faculty) other persons of liberal education, are admitted to the Graduate School. Admission to this School, however, shall not be understood as implying admission to candidacy for advanced degrees, which is subject to the regulations indicated below. Students are admitted to the Graduate School by the Dean of the University Faculty to whom applications for admission should be addressed.

Fees and Expenses:

Students are required to pay a library and incidental fee of \$10 a semester. Those who enter after the first week of the first semester or the second Tuesday of the second semester must pay an additional fee of \$5 for late registration. Students taking laboratory work must make small laboratory deposits. The estimated cost of room rent and board for students living in Lathrop or Benton Hall, the dormitories for men, varies, according to the room, from \$2.75 to \$3.25 a week. In Read Hall, the dormitory for women, it varies, according to the room, from \$5.50 to \$6.00 a week. The total necessary expenses of a student living in the dormitories for men need not exceed \$150 a year; for women living in Read Hall, they need not exceed \$250. The necessary expenses for students living in private families vary from \$4 to \$6 a week.

University Fellowship and Scholarships:

The University offers annually a limited number of University Fellowships yielding each a stipend of \$400 a year. These fellowships will be awarded, according as the applicants, irrespective of department, have demonstrated their ability to render service in the form of research. The University offers also a limited number of Scholarships bearing stipends of \$200 annually, open to graduate students of high promise in scholarship, irrespective of the lines of

work they may desire to pursue. It is expected that scholars will be well qualified to do graduate work in the subjects which they elect, and that they will devote themselves mainly to work in these subjects. They will be called upon to render a limited amount of service to the University. University Fellows and Scholars are allowed to engage in outside work only with the consent of the Graduate Committee and the Professor of the subject which they elect. The Executive Board, upon the recommendation of the Committee and Professor, may deprive any student of his fellowship or scholarship, whenever it may appear that he is not devoting himself as he should to his work as fellow or scholar. Applications must be filed not later than April 1, 1913 (March 1, 1914 and thereafter), in order to receive consideration in the award for the next academic year. Applications received after this date and not later than June 1 will be considered in filling any vacancies which may occur in the fellowships or scholarships. Application blanks may be obtained from the Registrar of the University and when filled out should be sent to the President of the University, Columbia, Missouri.

Curators' Scholarships:

By order of the Board of Curators, the student who attains the highest grade, or who shall be first in merit, in taking a Bachelor's degree, in the graduating class of any of the colleges or universities composing the Missouri College Union, will be admitted to this University for the first year without the payment of any tuition, library, and incidental fee.

Agricultural Research Fellowships and Scholarships:

The University offers annually a limited number of Research Fellowships in the Agricultural Experiment Station, each of the value of \$400, and Scholarships, each of the value of \$200. It is the purpose of these fellowships and scholarships to foster and encourage original investigation and to give opportunity to students who desire to become efficient investigators in the field of agricultural science. All candidates for these fellowships and scholarships must fulfil the requirements for admission to the Graduate School of this University. (See page 3.)

These fellowships and scholarships are available in the departments of Agricultural Chemistry, Agronomy, Animal Husbandry, Dairy Husbandry, Horticulture, Botany, and Entomology. They will be awarded to the candidates who are best prepared and are of the highest promise in scholarship. Application blanks for these fellowships may be obtained from the Director of the Agricultural Experiment Station, Columbia, Mo. Applications must be filed not later

than April 1, 1913 (March 1, 1914 and thereafter), in order to receive consideration in the award for the next academic year. Applications received after this date will be considered in filling any vacancies which may occur in these fellowships.

Literary and Scientific Societies:

A number of literary and scientific societies are maintained in the University.

The following, conducted by members of the faculties, are open to advanced students: "The Scientific Association," organized with a "General Section" and Special Sections of "Biological Science," "Mathematical and Physical Science," and "Social and Political Science," "The Philological Club," "Mathematical Journal Club," and "The University of Missouri Section of the American Chemical Society."

The following are conducted by students, in some cases with the participation of members of the faculties: "Medical Society," "Engineering Society," "Der Deutsche Klub," "French Club," "Sketch Club," "Asterisk Club," "History Club," "Branch of the American Institute of Electrical Engineers," "Branch of the American Society of Mechanical Engineers," "Physics Club," and "Forestry Club."

Publications:

The "University of Missouri Studies," several series in the "University of Missouri Bulletin" and the "Publications of the Agricultural Experiment Station" are maintained as a means of publishing the results of original research in the University by instructors and graduate students.

Laboratories and Museums:

Laboratories. Facilities for research in the sciences are provided in the following laboratories: Agronomy, Animal Husbandry, Anatomy, Astronomy, Bacteriology, Botany, Chemistry, Agricultural Chemistry, Dairy Husbandry, Engineering (Civil, Electrical, Sanitary, and Mechanical), Entomology, Experimental Psychology, Educational Psychology, Geology and Mineralogy, Horticulture, Pathology, Pharmacology, Physics, Physiology, Physiological Chemistry, Veterinary Science, and Zoology.

Museums. There are also museums of Art, Classical Archaeology, Ethnology, and Geology.

University Libraries:

The University libraries comprise the general library and many departmental libraries. They contain about 150,000 volumes and

pamphlets. Students have access also to the library of the State Historical Society of some 50,000 volumes and pamphlets.

Regulations Governing the Degree of Master of Arts:

The degree of Master of Arts is offered to students who have spent at least one year exclusively devoted to advanced courses of study, and who have submitted an acceptable dissertation and passed all prescribed examinations.

A student wishing to make application for this degree must fill out a blank form, provided for the purpose, and must present it to the Chairman of the Graduate Committee on or before October 15.

In order to be accepted as a candidate for the degree, the student must give evidence that he has completed an undergraduate course of study such as is offered by colleges of good standing and that he has received a baccalaureate degree equivalent to the baccalaureate degree of the University of Missouri.

In making application the student must indicate the subject of the dissertation and the course of study selected by him on the form referred to above, which must bear the signature of approval of the professor in charge of his major subject, before it is presented to the Graduate Committee for its action. He may, however, defer submitting the subject of the dissertation to the Committee until November 1.

The candidate must choose a major subject, to which he must devote the greater part of his time during the year, and also such other subjects as may be approved. A majority of all work represented in the course of study must be selected from the courses strictly graduate in character.

A dissertation evincing capacity for original research and independent thought in the subject of the major work must be submitted to the Committee for approval on or before May 15. The student should consult the Chairman of the Graduate Committee for information regarding the form in which the dissertation must be presented.

Each candidate for the degree of Master of Arts shall be required to pass final examinations, but the Graduate Committee, upon the recommendation of the faculty of the department in which the candidate is taking his major work, may excuse the candidate from the final examinations or from the requirement of a dissertation.

The attention of students is called to the fact that graduate work can not be subjected to rigid regulation and the Graduate Committee reserves the right to deal with each case on its individual merits.

With the approval of the professors concerned, such candidates

as have fulfilled all requirements may, at the close of the year, be recommended by the Graduate Committee for the degree of Master of Arts.

Regulations Governing the Degree of Doctor of Philosophy:

1. General Statement.

The degree of Doctor of Philosophy is offered to students who have pursued advanced courses of study, without serious interruption, for a period of at least three years, and who have submitted an acceptable dissertation and passed all prescribed examinations.

In order to be accepted by the Graduate Committee as a candidate for the degree of Doctor of Philosophy, the student must give evidence that he has completed an undergraduate course of study such as is offered by colleges of good standing, and that he has received a baccalaureate degree equivalent to the baccalaureate degree of the University of Missouri.

The Committee reserves the right to decide in each case whether the antecedent training has been satisfactory, and, if any of the years of advanced work has been passed away from this University, whether they may be properly regarded as spent in university studies under suitable guidance and favorable conditions. Private study, or study pursued at a distance from libraries and laboratories, will not be considered as equivalent to university work. In any case the student must spend the year immediately preceding his final examinations in residence at the University of Missouri.

It should be emphasized that the requirements for this degree are not computed in terms of time and courses, but that the degree is conferred only upon such students as have reached, after long study, a high attainment in some special branch of learning and have given the clearest evidence of their ability to carry on independent, original research by reason of having made an actual contribution to knowledge of a character approved by competent judges.

2. Acceptance of Candidates.

A student wishing to make application for the degree of Doctor of Philosophy must fill out a blank form, provided for the purpose, secure thereto the signatures of the instructors with whom he desires to take his major and minor subjects and present it to the Graduate Committee for approval on or before October 15. He must also give satisfactory evidence of ability to translate French and German readily at sight.

3. Requirements for the Degree.

(a) **Subjects of Study.**—Every candidate for the degree must

select one principal or major subject, and at least one and not more than two subordinate or minor subjects, the combination to be approved by the Graduate Committee. The instructor with whom the student is taking his major subject acts as his official adviser and has the general direction of his work.

The student's principal work must be in the major subject. Although no regulations are laid down with respect to the time to be devoted to the major and minor subjects, in general it may be stated that the major subject should represent two-thirds of the student's entire time.

(b) Dissertation.—The dissertation, embodying the results of original investigation, must be written upon a subject approved by the adviser and must be submitted to the Committee in typewritten form on or before May 15, when it becomes the property of the University. The student should consult the Chairman of the Committee for information regarding the form in which the dissertation must be presented.

Upon receiving the dissertation a committee is appointed whose duty it is to report upon it in writing to the Graduate Committee.

The candidate is required to print or publish the dissertation, with such revision as the Committee may allow, and he shall present one hundred and fifty copies of the work to the library of the University. The Committee shall take any necessary action to insure the publication of the dissertation within one year after the conferring of the degree. A brief biographical sketch of the writer must be appended to the dissertation.

(c) Examinations.—A committee, consisting of the professor of the candidate's major subject and the professors of his minor subjects, is appointed to take charge of all examinations, and to report upon the same to the Graduate Committee in writing.

In addition to final written examinations the candidate may be required to take an oral examination in the presence of the Faculty.

(d) Conferring of Degree.—Upon the satisfactory completion of all requirements, the candidate may be recommended by the Graduate Committee for the degree of Doctor of Philosophy.

COURSES OF INSTRUCTION.

Courses preceded by a number with the letter a attached, thus: 104a, 106a, are given the first semester only. Those preceded by a number with the letter b attached, thus: 104b, 106b, are given the second semester only. Those preceded merely by a number are continuous courses and are given both semesters. The number of hours credit given for a course for each semester is indicated by the Arabic numerals following the statement of the course. Courses numbered 200 and above are strictly graduate in character.

GROUP OF CLASSICAL LANGUAGES.

CLASSICAL ARCHAEOLOGY.

106. **History of Greek Art.**—A preliminary study of Assyrian and Egyptian Art, followed by a study of the development of Greek Architecture and Sculpture. Lectures, collateral reading, essays, with constant use of the lantern, photographic reproductions, and models and casts in the Museum of Classical Archaeology. Ancient History is recommended to the students of this course. (3). Mr. Pickard.

107a. **Mycenaean Art or Art of Primitive Greece.**—The earliest discoveries at Mycenae, Tiryns, and elsewhere will not be neglected but special attention will be given to the most recent publications on Troy, Crete, and the Argive Heraeum. (1). Mr. Pickard.

108b. **Introductory Study of Greek Vases and Vase Paintings.**—(1). Mr. Pickard.

While a knowledge of the Greek Language is not an absolute prerequisite for 107a and 108b, these courses are intended for advanced students in Greek.

109. **Etruscan and Graeco-Roman Art.**—This course should be preceded by course 106. It will deal with the earliest art of the Italian Peninsula, endeavor to show how this art reached its highest development among the Etruscans, how Etruscan influenced early Roman Art, how later Roman Art grew out of early Roman and late Greek Art modified by the circumstances and character of the Romans. Ancient History is recommended to students in this course. (2). Mr. Pickard.

110. **Roman Life.**—A systematic study of the topography of Rome and of extant remains particularly of Rome and Pompeii. Lectures and readings. Illustrated by the use of plans, maps, and lantern slides. As supplementary to this course, Roman Public and Private Life (Latin 105) is recommended. (2). Mr. Pickard.

214. **Topography and Monuments of Athens.**—Frazer's *Pausanias* will be taken as the basis of discussion. A reading knowledge of Greek, French and German required. (2). Mr. Pickard.

215. **Archaeological Seminary.**—Hours and work to be arranged. Mr. Pickard.

For courses in the History of Art, see page 51

GREEK.

113a. **The Greek Theater.**—The origin and development of the Greek Theater will be considered, and disputed points in the structure of the theater and in the presentation of plays will be discussed. The basis of the work will be Doerpfeld and Reisch's *Das Griechische Theater*. (1). Mr. Manly.

114b. **Aristophanes.**—Selected comedies will be read, and the origin and development of comedy will be considered. Attention will also be given to the life of the people as revealed in the plays. (2) or (3). Mr. Scoggin.

216. **Hesiod and Homeric Hymns.**—Students should provide themselves with *Hesiodi Carmina* ed. A. Rzach, Teubner, Leipzig and *Hymni Homerici* ed. A. Baumeister, Teubner, Leipzig. (2) or (3). Mr. Manly.

217. **Homer.**—The whole of the *Iliad* and the *Odyssey* will be read during the year with especial attention to the antiquities. A special subject will be assigned each student for investigation. Teubner text editions of the poems should be secured in advance. (2) or (3). Mr. Manly.

218a. **Historical Greek Grammar.**—Phonology and Morphology. The lectures will deal systematically with noun and verb inflection within the Greek language itself. The student should procure Brugmann's *Griechische Grammatik* and Solmsen's *Inscriptiones Graecae ad inlustrandas dialectos selectae*. (3). Mr. Scoggin.

219b. **Historical Latin Grammar.**—The sounds and inflections of the Latin language will be set forth briefly in lectures. The student should own Lindsay's *Latin Language* and the same author's *Latin Inscriptions*. (3). Mr. Scoggin.

220. **Elementary Sanskrit.**—Elements of the language. Translation of Sanskrit into English and English into Sanskrit. Thorough drill in forms. Whitney's *Grammar*. Lanman's *Reader* and Perry's *Primer*. (3). Mr. Scoggin.

LATIN.

104. **Latin Prose Composition.**—(Prerequisite, course 2). (1). Mr. Hays.

105. **Roman Public and Private Life.**—(Prerequisite, Courses 1 and 6). (a) Cicero's Letters; (b) Pliny's Letters. (3). (Not offered in 1913-14). Mr. Colburn.

106a. (a) **Catullus, Tibullus, and Propertius**; (b) **Juvenal and Persius.**—(Prerequisite, Courses 1 and 6). (3). (Not offered in 1913-14). Mr. Colburn.

109. (a) **Plautus and Terence**; (b) **Lucretius.**—(Prerequisite Courses 1 and 6). Miss Johnston.

110. (a) **Tacitus, Annals**; (b) **Quintilian X-XII.**—(Prerequisite, Courses 1 and 6). Mr. Jones.

111. **Rapid Reading.**—(Prerequisite, Courses 1, 6, and 105, or an equivalent). Mr. Miller.

217. **Seminary.**—Roman Inscriptions. Their evidence for the study of history and private life. (3). Mr. Colburn.

224. **Latin Metre.**—During the first semester, especial attention will be given to the metre of comedy and dactylic hexameter, during the second semester to lyric measures. (1). (Not offered in 1913-14). Miss Johnston.

GROUP OF MODERN LANGUAGES.

ENGLISH.

104. **The Romantic Movement.**—The revolt against classicism in the eighteenth century; the romantic triumph in Scott, Wordsworth, and Coleridge; the radicalism of Byron and Shelley; the neo-classicism of Keats. (3). Mr. Tisdell.

105. **English Literature of the Eighteenth Century.**—First semester: Dryden and Pope. Second semester: Swift and the Essayists. (3). (Alternates with 110. Not offered in 1913-14). Mr. Bel-den.

107. **Shakespeare.**—Four or five selected plays; class-room reading and interpretation. A thesis is required. (3). Mr. Fairchild.

108. **Shakespeare.**—The course will be devoted to the history of Shakespeare criticism and to the study of some of the formal elements of the plays (technique, language, versification, etc.). Should be taken in conjunction with or after course 107. (2). Mr. Fairchild.

109. **Tennyson and Browning.**—An intensive study of the poetry of Tennyson and Browning. Lectures and collateral reading in the literature of the Victorian period. (3). (Alternates with 104. Not offered in 1913-14). Mr. Tisdell.

110. **American Literature.**—(a) Sectional development; (b) growth of nationality; (c) present tendencies. The leading writers in prose and verse will be considered, first, as to their intrinsic worth; and secondly, as illustrative of national development. (3). Mr. Belden.

111. **History of the English Language.**—An introductory course on linguistic study, taking first the present facts of the language, its sounds, vocabulary, inflections, and syntax, and second its past development through each period. No previous knowledge of Anglo-Saxon or Middle English is required. (3). Mr. Ramsay.

112a. **Anglo-Saxon Literature.**—An early reading knowledge of Old English will be sought, to be followed by rapid reading of a variety of selected texts chosen rather to illustrate Anglo-Saxon life and thought than for intensive phonological study. (3). Mr. Belden.

113b. **Middle English Literature.**—The class will read a large number of selections representative of different aspects of medieval English life and literature from the Norman Conquest to Chaucer. (3). Mr. Rankin.

114. **Modern Prose Writers.**—A study of the works of representative authors, with weekly reports and monthly essays. (3). Mr. Miller.

117. **Recent and Current English Literature.**—The representative writers and literary movements in England from about 1875 to the present day will be studied principally by lectures and reports. During the first semester the leading poets, novelists, and essayists of the period will be considered, with special emphasis upon Stevenson, Swinburne, Wilde, Meredith, Hardy, and Kipling. The second semester will be devoted to a study of the chief movements still in progress, realism and naturalism, symbolism, nationalism, as manifested in contemporary drama, fiction, and poetry. (3). Mr. Ramsay.

118a. **English Versification.**—(2). Mr. Miller.

119. **Theories of Poetry.**—Theories of poetry in general, and the application of the principles of criticism to the different literary forms such as the lyric, the epic, and the drama. (2). Mr. Fairchild.

120a. and 120b. **Advanced Composition.**—An informal course in practical composition open to a limited number of upperclassmen who make application in advance. (3). Mr. Miller.

127a. **The Argumentative Address.**—A study of the principles of argumentation; practice in the drawing of briefs and in the writing of forensics; debating. (3). Mr. Tisdell.

116b. **Debating.**—Investigation of special questions; practice in debate. Designed especially for members of the debating squad. (This course naturally follows 127a.) (3). Mr. Tisdell.

126b. **The Expository Address.**—A study of structure and style, with special reference to the expository address; collateral reading in oratorical literature; practice in writing and speaking. (2). Mr. Tisdell.

206b. **Style and Usage.**—An advanced course in the theory and practice of English composition, involving the investigation of important questions of usage, structure, and style. (3). Mr. Miller.

215. **Beowulf.**—The study of the poem will be pursued as an exercise in Old English phonology, in text-criticism, and in the investigation of poetic principles. (3). Mr. Belden.

216. **Historical Grammar.**—A selected series of topics in the development of Primitive Germanic, Anglo-Saxon, and Middle English. (3). (Not offered in 1913-14). Mr. Ramsay.

219b. **Popular Ballads.**—A study of popular poetry on the basis of Child's English and Scottish Popular Balladists, with analysis of the theories of Gummere, Meier, Henderson and others, and illustrations from balladry in Missouri. (2). (Not offered in 1913-14). Mr. Belden.

220. **Literary Criticism.**—The history of critical theory will first be traced and the standard works read. This will be followed by more distinctly constructive work in which the problems of criticism will be considered and an attempt made to determine the grounds of literary judgment. (3). Mr. Fairchild.

222. **The Rise of the Drama.**—From the beginning of the modern drama in the liturgical plays of the tenth century, through the English miracles, moralities, and interludes, to the immediate predecessors of Shakespeare. (3). Mr. Ramsay.

223. **Elizabethan Drama.**—History of the earlier Elizabethan Drama; study of the works of Lyly, Kyd, Greene, Peele, and Marlowe; the doubtful plays of Shakespeare. (3). Mr. Fairchild.

224. **Seminary.**—Milton. Hours and credit to be arranged.

GERMANIC LANGUAGES.

104a and 104b. **Masterpieces in Modern German Drama, Lyrics, and Novel.**—Intensive study, from the literary and cultural side, of a number of carefully chosen Modern German dramas, lyric poems, and novels. Parallel reading and reports. (3). Mr. Almstedt.

105a. **Outline Course in German Literature.**—The aim of the course is to acquaint the student with the most important works and movements in the evolution of German literary life. (3). Mr. Hoffman.

106b. **Lessing.**—Lectures on Lessing's life and works; intensive study of Lessing the dramatist and the critic; essays written in German. Course conducted in German. (3). Miss Stewart.

107. **Schiller.**—This course will consist in the study of Schiller's *Jungfrau von Orleans*, *Maria Stuart*, *Braut von Messina*, *Wilhelm Tell*, *Wallenstein*; essays in German, based on the texts; lectures on Schiller's life and works. Course conducted in German. (3). Mr. Hoffman.

108. **Goethe.**—Lectures on Goethe's life and works; intensive study of Goethe's prose, poetry, and dramas; essays written in German. Course conducted in German. (3). Mr. Almstedt.

109b. **Outline Course in Historical Grammar.**—This course together with 105a is arranged to meet the needs of the prospective teacher of German. Though a knowledge of the older periods is desirable, it is not required. (3). Miss Stewart.

110b. **Advanced Composition and Conversation.**—Advanced course in German theme-writing; discussions of grammatical, syntactical, and stylistic points. This course is intended for teachers

of German or for students who propose to become teachers of German; conducted in German. (2). Mr. Hoffman.

111b. **Middle High German.**—(Introductory Course). For advanced seniors. The class will study *Der arme Heinrich* by Hartmann von Aue. Translation into modern German of medieval idiom. (3). Mr. Almstedt.

212. **German Literature of the Second Half of the 19th Century.**—This course will consist of lectures and reports. During the first semester Hebbel, Ludwig, Freytag, and Wagner will be especially emphasized. The minor authors will be treated in lectures. The second semester will be devoted to a study of the realistic writers of Germany, especially Hauptmann, Sudermann, Wildenbruch, and Fulda. The foreign influence on these writers will be carefully considered. (3). Mr. Price.

213b. **Romanticism.**—This course is intended to comprise an exhaustive study, as far as is possible, of German romanticists and their works; and to show the relation of this movement to similar ones in other literatures. (3). Mr. Hoffman.

214a. **The Reformation and Renaissance (1500-1750).**—This course is to give the student a clear view of the development and decline of the literary tendencies, forms and ideals of this period, and the influences that help to develop them or to accelerate their decline. (3). Mr. Hoffman.

215b. **Middle High German.**—Walther Von der Vogelweide. Discipline in phonology, morphology, syntax; comparison of medieval with modern idiom; a study in lyric poetry. (3). Mr. Almstedt.

216b. **History of the Nibelungenlied.**—This course is to comprise a study of the various theories as to the origin and authorship of the poem, the controversies in regard to it, and its relation to the Nibelungensaga and other sagas. A reading knowledge of Middle High German is required. (3). Mr. Hoffman.

217b. **Old High German.**—Phonology and forms; critical reading of Old High German texts. Prerequisite, Course 220a. Texts: Braune, *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*. (3). Mr. Almstedt.

218a. **Old Norse.**—Phonology and forms; critical reading of one or more sagas. Prerequisite, Gothic (Course 220a). Texts: Kahle,

Altisländisches Elementarbuch and Heusler, Zwei Isländer-Geschichten. (2). Mr. Almstedt.

219b. **Old Saxon.**—Phonology and forms; critical reading of the Heliand. A desirable prerequisite; Gothic (Course 220a). (2). Mr. Almstedt.

220a. **Gothic.**—Phonology, morphology, and syntax; reading from Ulfilas; the relationship of Gothic to Indo-European and to later Germanic dialects; general introduction to the study of Germanic Philology. (5). Mr. Almstedt.

221. **Current Publications.**—(1). Miss Stewart.

Any other courses in Germanic Languages will be arranged if the needs of the students require.

222. **Seminary.**—Subject to be determined. For special students only. (2).

ROMANCE LANGUAGES.

French.

101. **General Phonetics.**—The organs of speech, sound formation, etc., with special application to the pronunciation of French and other modern languages. (1). Mr. Murray.

104. **Composition and Conversation.**—(Prerequisite, course 3). Translation into French of standard English; original themes; study of syntax, grammatical problems, style; conversation. (2). Mr. Underwood.

106. **French Literature.**—(Prerequisite, course 3). A general outline of the various periods. Lectures, reading of selected works from the period, critical works, and reports. Relation of French literature to other European literatures. (3). Mr. Murray.

107. **The Literature of the Seventeenth Century.**—(Prerequisite, course 3. Course 106 is also recommended as a preliminary). A more detailed study of writers and literary movements of the classical period; the development and fixation of forms: the drama, etc.; the development of prose. (3). Mr. Underwood.

108. **The Literature of the Eighteenth Century.**—(Prerequisite, course 3). The richness of this literature in historical, social, and

scientific ideas will be emphasized. Students will be permitted to make an individual study of a single writer, such as Voltaire or Rousseau, or of a definite literary form, such as the novel or the drama. The relations between English and French thought and literature. Lectures, conferences, reading. (3). Mr. Warshaw.

109a. **The Literature of the Nineteenth Century.**—(Prerequisite, Course 3). The revolt against classicism, its causes and results; the Romantic and other movements down to recent times. Lectures, reading, reports. (3). Mr. Cavicchia.

110b. **The Literature of the Nineteenth Century.**—(Prerequisite, Course 3). Recent and contemporary writers; present literary tendencies in France. Lectures, reading, reports. (3). Mr. Cavicchia.

111. **The Language and Literature Down to the Sixteenth Century.**—(Prerequisite, Course 106). Lectures. (1). Mr. Murray.

112. **The Literature of the Sixteenth Century.**—Lectures, reading, reports. (2).

212. **Seminary in French Literature.**—Detailed study of some literary movement or representative writer. (2), (3), or (4). Mr. Murray.

214. **General Introduction to Romance Philology.**—(2). Mr. Murray.

215. **Old French.**—(Prerequisite, course 214). (2). Mr. Murray.

216. **Seminary in Romance Philology.**—Provençal, Old Spanish, Old Italian. (2). Mr. Warshaw; Mr. Cavicchia; Mr. Murray.

Italian.

121. **Dante.**—First semester: *La Vita Nuova*; *L'Inferno*. Second semester: *Il Purgatorio*; *Il Paradiso*. (3). Mr. Cavicchia or Mr. Murray.

122a. **Petrarch and Boccaccio.**—(2). Mr. Cavicchia or Mr. Murray.

123b. **The Sixteenth Century.**—Pulci, Ariosto, Tasso, etc. (2). Mr. Cavicchia or Mr. Murray.

Italian Philology.—See courses 214 and 216.

Spanish.

132. **The Great Epochs of Spanish Literature.**—A survey of Spanish literature will be made, with particular emphasis on the periods of most noteworthy production. Students will be permitted to select an individual writer or a definite type of literature for special study. Lectures, conferences, reading. (2). Mr. Warshaw.

233. **Seminary in Spanish Literature.**—Detailed study of some literary movement or representative writer. (2). Mr. Warshaw.

Spanish Philology.—See courses 214 and 216.

GROUP OF PHILOSOPHY AND EDUCATION.**EDUCATION.**

110a. **Educational Psychology.**—(Advanced Course). This course aims to give a thorough treatment of a few of the most important phases of mental development, and is adapted both to those who have had an elementary course in this field and to those who have had an extensive course in General Psychology without reference to educational problems. (3). Mr. Pyle.

111b. **Scientific Testing of Methods.**—It is the purpose of this course to apply the results of psychological investigations to the problems of the school room, in examining and testing methods of teaching, the classification and grading of pupils, the determination of individual types and capacities, and in ascertaining the characteristics of the learning process. Prerequisite, 110a or its equivalent. Lectures and laboratory work. (3). Mr. Pyle.

112a. **The Abnormal Child.**—A study of subnormal and super-normal children from the standpoint of genetic psychology. Examination of the causes of these deviations, tests for their determination and a study of their proper treatment. (1). Mr. Pyle.

113. **Current Problems.**—A study of current problems in education from the point of view of psychology. Informal discussions and reports of periodical literature in educational psychology. The object of this course is to acquaint the student with present-day educational problems and give a basis and perspective for their scientific consideration. (1). Mr. Pyle.

120. **History of Education.**—The purpose of this course is to give a better understanding and appreciation of present educational

tendencies by tracing historically those educational movements which have been most effective in determining the present educational situation or are typical or prominent aspects of it. (2). Mr. Coursault.

121a. **Educational Classics.**—An intensive study of the historical setting and content of a few educational classics which mark prominent movements in the development of educational thought and practice. (3). Mr. Coursault.

122b. **History of Education in the United States.**—A research course for advanced students. (2). Mr. Coursault.

130a and 130b. **Theory of Teaching.**—A general course which aims to formulate a method of class work, and to illustrate as fully as time will permit its application to subjects in all grades of school work. (3). Mr. Charters.

150a. **School Supervision.**—A study in the principles of school supervision, in which emphasis is laid upon the relation between superintendent, supervisors, teachers, and pupils. Practical problems such as attendance, classification, government, reports, exhibits, will be briefly considered on the basis of this relation. The course consists largely of observational studies in the University Schools. (2). Mr. Meriam.

150b. **Supervision of Instruction.**—A study in the principles and practice of class criticism, arranged for superintendents, principals, and supervisors in public schools and normal schools. Outlining studies, providing materials of instruction, helping pupils study, determining upon tests of efficiency, are the leading problems in the course. Laboratory work supervising in the University Schools is a part of this course. (3). Mr. Meriam.

151. **Elementary Education.**—A study is made of the function of the elementary school in modern life and the nature of the curriculum needed to meet this aim. Elementary problems of school management and current methods of teaching reading, arithmetic, geography, etc., are studied. This course is planned for those preparing for special work in teaching or supervising in elementary schools, and includes much observation and laboratory work in the University Elementary School. (1), (2) or (3). Mr. Meriam.

106b. **School Economy.**—A course in effective methods of school management from the standpoint of the teacher in secondary schools. (2). Mr. Elliff.

161b. **School Administration.**—A general treatment of the important administrative problems of principals and superintendents in small city school systems, for which the class meets twice a week. The third hour of credit will be given for individual practice work in the investigation and solution of practical problems involved in the administration of the University High School, the University Elementary School and the Columbia Public Schools. (2) or (3). Mr. Elliff.

163a. **High School Administration.**—(Prerequisite, Education 2a and 120 or equivalent). A consideration from the standpoint of the administrator of the main problems now confronting secondary education in the United States, with special reference to conditions in Missouri. The principal topics considered are: relation of high school to elementary school, college and community; organization and direction of teaching staff; equipment; government; reorganization of curriculum with special attention to vocational training, physical education and social life of high school; elimination of pupils; keeping, interpretation and use of high school statistics; financing of secondary education. Open for credit only to superintendents, high school principals, and experienced high school teachers. (2). Mr. Elliff.

170b. **Principles of Education.**—The purpose of this course is to give insight into the meaning of education and thereby to reveal the fundamental principles upon which educational procedure should rest. (3). Mr. Coursault.

180a and 180b. **Practice Teaching.**—Hours and credit must be arranged with the instructor before registration. Application should be made in the semester preceding that in which this course is wanted. Mr. Meriam.

210. **Seminary in Educational Psychology.**—The special problems selected for study will depend upon the interest of those taking the course, the aim being to guide advanced students of Education in constructive work in the theory of education through a detailed study of a few aspects of mental development. The course is open only to students who have had considerable training in both education and psychology. For thesis work. Credit to be arranged. Mr. Hill and Mr. Pyle.

211. **Research Course in Educational Psychology.**—Original investigation of problems in mental development or in any field of educational psychology. Open only to students who have had training in both general and educational psychology, including training in psychological method. Credit to be arranged. Mr. Pyle.

220. Seminary in the History of Education.—A critical investigation of topics in connection with the thesis work for the graduate degrees. Mr. Coursault.

230. Seminary in Theory of Teaching.—An intensive study of some problems in theory of teaching. The problems selected will depend in part upon the interests of the students. Considerable use is made of psychology and history of education, satisfactory work in both being a prerequisite to this course. (3). Mr. Meriam and Mr. Charters.

250. Seminary in School Supervision.—An intensive study of problems in connection with thesis work for graduate degrees. Opportunity is offered for experimental work in the University Schools. Mr. Meriam.

251. The Public School Curriculum.—Research work on courses of study for elementary schools and for high schools. A close examination is made of typical curricula in schools of this country and foreign countries; also curricula of special schools. Study is made of the development of the curriculum to meet changing social and industrial conditions in community and national life, and to comply more adequately with the psychological development of the pupil. (3). Mr. Meriam.

260b. Seminary in School Administration.—A research course in school organization and administration with special reference to city school systems. The course is to be taken only in connection with thesis work for the graduate degree. Mr. Eliff and Mr. Meriam.

270. Seminary in Philosophy of Education.—An intensive study of Philosophy of Education made in connection with thesis work for the graduate degrees. Mr. Coursault.

271. Philosophy of Education.—This course begins with a critical study of typical theories of knowledge and leads to a voluntaristic theory, in the interpretation of which a philosophy of education is developed. The fundamental ideas acquired are then used in the interpretation and criticism of a variety of modern contributions to educational literature. (3). Mr. Coursault.

In addition to the above, a number of courses in the teaching of Botany, English, German, etc., and in the Administration of School subjects are offered and may be counted as Education for the degree of Master of Arts.

For a statement of these courses, see the announcement of the School of Education in the General Catalogue.

EXPERIMENTAL PSYCHOLOGY.

These courses are open only to students who have had an introductory course in General Psychology.

103a or b. **Graphology.**—The manifestation of individual characteristics in peculiarities of script. Methods of identifying individual handwriting and of discovering forgeries. (3). Mr. Meyer.

104a or b. **General Esthetics.**—An experimental as well as theoretical study of the psychological laws underlying our appreciation of the beautiful, chiefly in the arts of painting, sculpture, and architecture, and also in nature. No familiarity with the technique or history of art is required. The aim of this course is to develop in the student an independent judgment in questions concerning the beautiful. (3). Mr. Meyer.

105a or b. **Theory of Music.**—The esthetic laws of music. The psychological differences between primitive and highly developed music, and between European and exotic music. (3). Mr. Meyer.

106a or b. **Principles of Psychology.**—Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. (3). Mr. Meyer.

107a or b. **Comparative Psychology.**—Mental development. Experiments upon the mental processes of animals. Theories of mental evolution. (2). Mr. Meyer.

108a or b. **Abnormal Psychology.**—The abnormalities of mental life resulting from inborn, pathological, or artificial causes (such as idiocy, aphasia, apraxia, somnambulism, hypnosis, etc.) and their educational, medical and forensic significance. (2). Mr. Meyer.

109a or b. **Psychological Systems.**—A comparative study of the psychological systems as found in the chief text-books on psychology issued during the last thirty years. (4). Mr. Meyer.

211a or b. **Psychological Seminary and Advanced Laboratory Work.**—Critical reading of recent literature. Discussion of special problems and theories. Research work. Mr. Meyer.

PHILOSOPHY.

103a. Ethical Theory.—An introductory study of the main problems of ethics and of the chief methods of their solution, with constant reference to the principal historic schools for illustration and interpretation. The following topics will be included: the nature and method of ethics as a philosophical discipline; freedom; the ground of obligation; conscience; egoism and altruism; optimism and pessimism; hedonism; utilitarianism; intuitionism; self-realization. (3). Mr. Hudson.

104a. History of Ancient and Medieval Philosophy from the Ionian Schools to Bacon.—The work of the course will include a careful reading of the greater part of Plato's Republic. Lectures, required reading, oral and written reports. (3). Mr. Hudson.

104b. History of Modern Philosophy from the Renaissance to the 19th Century.—Lectures, class-room discussions, required reading, written reports. (3). Mr. Rogers.

105b. Contemporary Tendencies in Metaphysics.—A consideration of representative systems, issues, and controversies of the present day, together with their general relations to historic philosophy. Stress will be laid upon the problems and tendencies characteristically modern in their setting, such as those aroused by the development of modern science. Lectures, required reading (including reference to the principal philosophic journals), reports and conferences. Open only to those who have had 104b or its equivalent. (3). Mr. Hudson.

109a. English Thought in the Nineteenth Century.—An untechnical account of the main tendencies which have influenced popular thought in recent times. It will deal with such men as Wordsworth, Shelley, the Utilitarians, Spencer, Arnold, Carlyle, Tennyson, Ruskin, Emerson, Stevenson and others. In the last part of the semester contemporary writers will occupy a considerable portion of the time. Lectures, reading and discussion. (3). Mr. Rogers.

110a. English Scientific Naturalism.—A study of the presuppositions underlying the views of Mill, Spencer, Huxley, and others of their contemporaries, and their application to philosophical problems. Reading, reports and discussion. (2). Mr. Rogers.

112b. American Ideals.—A study of the ethical interpretations of life implied in American social and political institutions. (3). Mr. Hudson.

230. **Seminary.** Subject to be determined. Two or three hours credit according to the amount of work done. Mr. Rogers and Mr. Hudson.

GROUP OF HISTORY AND POLITICAL SCIENCE.

ECONOMICS.

105a and b. **Money, Credit, and Banking.**—This course involves a study of the relation of the production of the precious metals and the banking business to the supply of money and the prices of commodities. An inquiry is also made into the organization and operation of the banking business in the leading nations with special reference to its bearing on loan and discount rates and the development of business. Mr. Stewart.

106a or b. **Economics of Transportation.**—A history of the development of transportation agencies, and a study of the principles of rate-making and rate-regulation. (3). Mr. Huse.

107b. **Economic History.**—The American people in their advance from the simple economic life of colonial days to the complex activities of the present; the development of industry, commerce, transportation, finance, money and banking, and labor organization. The economic movements in other countries will be considered wherever they have had important influence on American development. (5). Mr. Huse.

108 or b. **Insurance.**—The general principles, the different forms of personal and property insurance, and the main problems connected with each. (2). Mr. Davenport.

110a or 110b. **Problems of Labor.**—A study of the special problems and interests of wage earners, such as the organization and policies of trades-unions, employers' associations, arbitration, profit-sharing, factory acts and other forms of labor legislation. (3) to (5). Mr. Huse.

113a or b. **Public Revenues.**—A critical examination of (1) the various theories as to the limits of State activity; (2) Various ethical systems as related to the problem of Justice in Taxation; (3) Proportional vs. Progressive Taxation; (4) The later developments in Value Theory as bearing on the more difficult problems of Incidence; (5) The administrative aspects of Income Taxation; (6) Ethical, legal,

and constitutional aspects of Franchise and Corporation Taxation; (7) The practicability of a scientific articulation of the various taxes under American conditions. (3) to (5). Mr. Davenport.

117a or b. **Accounting.**—This course treats of the construction and interpretation of the accounts of the private business, the partnership and the corporation. It involves a study of the use of the income account and balance sheet in connection with the capitalization and valuations of property, and the relation of cost accounts to business and industrial efficiency. (3) to (5). Mr. Comer.

118a or b. **Trusts and Combinations.**—This course treats of the development of business organizations, the financing of such enterprises, their relations to the control of industry, the prices of commodities and the distribution of wealth. (3) to (5). Mr. Veblen.

211. **Advanced Economic Theory.**—A critical examination of the writings of the leading economists from the time of Adam Smith to the present to the end of constructing a correct theory of value and distribution. A survey of the theoretical aspects of the science. Credit to be arranged. Mr. Davenport.

214. **History of Economics.**—A first-hand study of authors and documents, with especial reference to the background of political and industrial conditions and of philosophical thought. (2) or (5). The student is advised to correlate this course with related courses in Philosophy, Political Science, History and Sociology. Mr. Veblen.

212. **Seminaries.**—Credit to be arranged. Mr. Davenport, Mr. Huse, Mr. Veblen.

219. **Economic Factors in Civilization.**—An inquiry into institutions as affected by economic conditions with a view particularly to early European civilization. (2) to (5). Mr. Veblen.

232a or 232b. **Socialism.**—A consideration of the essential features of the socialistic program from the standpoint of economic and sociological theory. An examination will be made of some of the writings of representatives of different types of socialistic thought. Particular attention will be given to those of Karl Marx and of the leaders of modern French and German Socialism. (2) to (3). Mr. Veblen.

HISTORY.

100b. **Recent European History.**—The political, social and institutional history of the chief European countries since 1815 will be carefully studied with a view to present conditions. (5). Mr. Church.

105a. **History of the Hebrews.** The sources for Old Testament History, the religions and social development, the background for Christianity, and the later Judaism. (3). Mr. Olmstead.

130a. **Mediaeval History (1100-1300).**—A study of the political and institutional development of the period. (3). Mr. Wrench.

110. **History of the United States.**—This is an advanced course for mature students beginning the study of American History in the University. The period since 1763 will be especially emphasized. (3). Mr. Viles.

140b. **American Social History.**—A survey of the development of American society, with emphasis on the economic and social progress since the Revolution. (3). Mr. Stephens.

170a. **History of Missouri.**—The primary aim of this course will be to give an account of the development of Missouri since 1803. (1). Mr. Viles.

175b. **History of the West.**—A study of the westward movement of population, the economic, social, and political development of the west, and the reaction of western ideals and influences on United States history. (3). Mr. Viles.

175a. **History of the South.**—A study of the economic, social, and political development of the south. The agricultural system, with its dependence upon unfree labor and the resulting political theories, will make up the background to the course. (3). Mr. Stephens.

115a. **Modern England.**—A course dealing with the internal and external problems of England and the British Empire since 1660. (3). Mr. Trenholme.

120b. **English Constitutional History.**—An advanced English History course dealing with the growth of English government and law as a background to present conditions in the British Empire and America. (3). Mr. Trenholme.

125a. **Advanced Ancient History.**—Studies in the economic and social life of antiquity with especial reference to commerce and the land question. (2) or (3). Mr. Olmstead.

185b. **Advanced Medieval History.**—Studies in the economic and social life of the Eastern Roman Empire. (2) or (3). Mr. Wrench.

160b. **The Reformation.**—A study of the Protestant Revolt and of the forces which it released. (2) or (3). Mr. Church.

165a. **The French Revolution and the Napoleonic Era.**—Lectures, with discussion, based on text and collateral reading, on the political history of the period. (2) or (3). Mr. Church.

170b. **Recent United States History.**—A course on the history of the United States since 1865, from the point of view of the historical background of present day problems. (3). Mr. Viles.

200. **Historiography and Historical Method.**—A course of training for students intending to do advanced and graduate work in history. (1) or (2). Mr. Trenholme, assisted by the other members of the department.

210. **Seminary in Ancient History.**—The Roman conquest of the eastern Mediterranean, the Euphrates frontier and its legions, the organization of the provinces, and the life of the subject peoples. (2) or (3). Mr. Olmstead.

215. **Seminary in Medieval History.**—The barbarian invasions of the Roman Empire, with special reference to the resulting social and political changes. (2) or (3). Mr. Wrench.

220a. **Seminary Course in American Diplomatic History.**—A study of the foreign relations of the United States with especial emphasis on the diplomatic side of our relations with British America and the Spanish American nations. (3). Mr. Stephens.

230. **Seminary Course in American Political Government and History.**—For the year 1913-14 the general topic for investigation will be the development of political parties, 1815 to 1840, with especial attention to the social and economic factors and to the political leaders. (2) or (3). Mr. Viles.

250. **Seminary in Historical Research and Thesis Work.**—A course giving opportunity for research and thesis work along special

lines. Primarily intended for candidates for graduate degrees. The work of the student will be under the direction of the instructor most interested in the field in which the topic of special research lies. (1), (2), (3), or (4).

POLITICAL SCIENCE AND PUBLIC LAW.

104a. **European Governments.**—A descriptive study of the constitutional organization and practical working of the principal governments of Europe; with considerable attention to political parties and current political questions. (3). Mr. Shepard.

105b. **Comparative Constitutional Law.**—A comparative study of the legal and theoretical basis of the modern state, the various forms of government and the structure and function of the principal governmental organs. (3). Mr. Shepard.

106b. **Municipal Government.**—A comparative study of the organization, functions, and administration of cities of Europe and the United States. During the latter part of the course special topics will be taken up in more detail, such as: central control over cities, municipal elections, municipal revenue, the regulation of public utilities, and municipal ownership. (2). Mr. Loeb.

107a. **Party Government.**—A study of the theory, organization, methods of action and functions of political parties, with special emphasis upon the party-system of the United States. (2). Mr. Shepard.

201a. **Colonial Government.**—A study of the present government and administration of the colonies of the United States and of other countries. (3). Mr. Shepard.

202a. **International Law.**—A general treatment of the law governing international relations in peace and war, with considerable attention to the development of arbitration and international organs of administration. (3). Not given in 1913-14. Mr. Shepard.

204. **Constitutional Law of the United States.**—Particular attention will be given to the field of individual liberty defined in the Constitution of the United States and interpreted in the decisions of the Supreme Court. (3). Mr. Loeb.

208b. **The Government of Missouri.**—A study of the constitutional development of the state from the Louisiana Purchase to the

present time, followed by a consideration of the organization and functions of the institutions of the central and local governments. (2). Mr. Loeb.

209b. **The Law of Taxation.**—A study of the legal rules regulating taxation in the central and commonwealth governments of the United States. The student is advised to correlate this course with related courses in Economics. (2). Not given in 1913-14. Mr. Loeb.

210. **History of Political Theories.**—A study of the development of political thought in its relation, as cause and effect, to political action, from the period of antiquity to our own day. (2). Not given in 1913-14. Mr. Shepard.

220. **Seminary.**—Credit to be arranged. Mr. Loeb; Mr. Shepard.

SOCIOLOGY.

110a. **Social Pathology.**—A study of the origin, nature, and treatment of the dependent and defective classes. As causes of poverty and degeneracy are studied physical and mental abnormalities, the unequal distribution of wealth, low wages and standards of living, unemployment, etc. As remedial and preventive agencies are studied educational and legislative measures, social reform movements, eugenics, public and private relief, organized charity, almshouses and other institutions for dependents and defectives, etc. Textbook work, assigned reading and papers on special topics. (3). Mr. Parmelee.

111b. **Criminology.**—A study of the causes, nature, and treatment of crime; the principles of criminal anthropology and psychology, criminal jurisprudence, and penology. Among the topics treated are criminal statistics, the social causes of crime, criminality and degeneracy, female and juvenile criminality, the evolution of criminal law, the reform of criminal procedure, prison systems and the county jail, the industrial reformatory, the indeterminate sentence, prison labor, probation and parole, the treatment of the juvenile offender. Text-book: Parmelee's Principles of Anthropology and Sociology in Their Relations to Criminal Procedure. Lectures and assigned reading. (3). Mr. Parmelee.

112b. **Preventive Philanthropy.**—An intensive study of some specific problems in preventive work, including a study of child problems, playgrounds, child labor, and the juvenile court. (2). Mr. Cross.

115a. **Rural Sociology.**—A study of social conditions in rural life. Among the topics considered will be the statistics and movements of rural population, the physical environment of rural life, isolation and means of communication, rural occupations, co-operative organizations among farmers, the family and woman's position in rural life, the country school, the country church, etc. The movements for the improvement of rural life will be considered. Lectures, assigned reading and papers. (2). Mr. Parmelee.

116b. **Urban Sociology.**—A study of social conditions in urban communities. The origin and growth of cities will be considered. An intensive study will be made of educational, political, moral, social, aesthetic, and religious forces and institutions in urban life. Municipal reform movements will be considered. Lectures, assigned reading and papers. (2). Mr. Parmelee.

125. **Anthropology and Ethnology.**—A study of the origin and evolution of man as an animal, and of the early stages in cultural evolution. Among the topics considered will be the prehistoric human types, the characteristics of the Negro, Mongolian, American and Caucasian races, the beginnings of human culture, the stone and metal ages, the origins of the division of labor, language, magic, religion, moral ideas, science, art, and of social organization in the family, horde, clan and tribe. Lectures and assigned reading. (3). Mr. Parmelee.

220a. **The Principles of Sociology.**—A critical study of sociological theory. The sociological theories of recent writers, such as Tarde, Ross, Giddings, and Hobhouse will be critically examined with a view to laying the foundations for a constructive theory of the social life in modern Biology and Psychology. Discussions and papers by the class. (3). Mr. Ellwood.

221a. **Biological Sociology.**—A course on the biological basis of sociology. Among the topics treated will be the relation of organic to social evolution with special attention to heredity; selection, adaptation, and variation, the beginnings of social evolution in the animal world, and the instinctive, emotional and intellectual forces for association. Parmelee's *Science of Human Behavior* will serve as a guide. Lectures, assigned reading and research work. (2). Mr. Parmelee.

222b. **Social Statistics.**—Statistical methods for the investigation of problems in social science will be studied. The principal statistical investigations which have so far been made will be analyzed and one or more problems will be given to each student to furnish practice

in quantitative treatment. Lectures, assigned reading and research work. (2). Mr. Parmelee.

226. **Ethnic Psychology.**—A study of the comparative psychology of races as shown in their customs, institutions, and social organization. (Not given in 1913-14.)

227a. **The Negro in America.**—A study of the social, economic, moral, and educational conditions among the negroes of the United States. The work will consist of lectures, library work, and theses. Students will be admitted only after consultation. (3). (Not given in 1913-14.)

230b. **History of Social Philosophy.**—Lectures on the development of social thought from Aristotle to the present. The social philosophies of Plato, Aristotle, St. Augustine, Thomas Aquinas, Machiavelli, Bodin, Hobbes, Locke, Vico, Montesquieu, Rousseau, Condorcet, and the sociological systems of Comte, Spencer, Shaeffle, Lilienfeldt, Gumpłowicz, Ratzenhofer, and Ward will, among others, be considered. A large amount of assigned reading will be required in this course. The student is advised to correlate this course with related courses in Economics, History, Political Science and Philosophy. (3). Mr. Ellwood.

231a. **History of Philanthropy and the Poor Law.**—A study of the development of legislation governing, and methods of administering public relief in England and America, and the parallel account of voluntary charitable institutions and methods. (2). Mr. Cross.

232a or b. **Socialism.**—See announcement under Economics.

240. **Seminary.**—Research work upon special problems in sociology and philanthropy. Two, three, or four hours' credit will be given according to the amount of work. Mr. Ellwood, Mr. Parmelee, Mr. Cross.

GROUP OF MATHEMATICAL AND PHYSICAL SCIENCES.

ASTRONOMY.

105b. **Modern Astronomy.**—A study of the problems and aims of modern astronomical science; its relation to other sciences. Frequent references to current literature of astronomy. Open to students who have completed Course 1a or 1b. (3).

106. **Advanced Astronomy.**—Subjects are selected to meet the requirements of individual students. Open to students who have completed Course 2 or Courses 4a and 105b. Credit to be arranged.

107. **Advanced Practical Astronomy.**—Theory and use of the equatorial telescope as an instrument of precision; its auxiliaries: the micrometer, the photometer, the spectroscope. Applications of the method of least squares. Open to students who have completed Course 2, Calculus and General Physics. (3).

108. **Theoretical Astronomy.**—The elements of celestial mechanics. Determination of parabolic and elliptic orbits; construction of ephemerides. Application to comets and spectroscopic binary stars. Open to students who have completed Course 107. (3).

209. **Astrophysics.**—The application of physical principles to astronomy. Methods and results, with their bearing on solar and stellar phenomena. Studies in photometry and radial velocity. Credit to be arranged.

220. **Research.**

CHEMISTRY.

111. **Organic Chemistry.**—Lectures, recitations, and laboratory work. (3). Mr. Calvert, Mr. Hawthorne, Mr. Waugh.

112a. **Preparation of Organic Compounds.**—A laboratory course in synthetic organic chemistry. May be taken with course 111. (2) or (3). Mr. Calvert.

113b. **Preparation of Organic Compounds and Organic Analysis.**—Laboratory Course. (3), (4) or (5), according to the amount of work elected. Mr. Calvert.

121. **Quantitative Chemical Analysis.**—The general principles of gravimetric and volumetric analysis. Laboratory work and lectures. (3). Mr. Gibson.

122a. **Technical Analysis.**—(Prerequisite, Quantitative Analysis 121). Gas, water, and fuel analysis. Required of chemical engineers. (3). Mr. Gibson.

123b. **Technical Analysis.**—(Prerequisite, Quantitative Analysis 121). The analysis of commercial products of an inorganic character. (3). Mr. Gibson.

125a. **Quantitative Organic Analysis.**—(Must be preceded or accompanied by Quantitative Analysis 121). Quantitative analysis of commercial organic products, such as alcohols, aldehydes, organic acids, glycerine, oils and fats, carbohydrates, petroleum products, soaps, etc. (3). Mr. Calvert.

126b. **Quantitative Organic Analysis.**—A continuation of 125a. (3). Mr. Calvert.

127. **Advanced Qualitative Analysis.**—(Prerequisite, Qualitative Analysis 27a or 27b). The complete qualitative analysis of rocks, minerals, slags, and alloys. (2). Mr. Gibson.

131. **Physical Chemistry.**—(Prerequisite, Organic Chemistry 111). Stoichiometry of gases, liquids and solids; solutions and the theory of ionization; thermo-chemistry; the phase rule; chemical equilibrium. Lectures or recitations (two), laboratory (one), (two) or (three). According to amount of laboratory work elected. (3), (4) or (5). Mr. Schlundt.

133. **Electro-chemistry.**—(Prerequisites, Organic Chemistry 111; Physics 3). Lectures, recitations and laboratory work in electro-chemical measurements. Lectures (two); laboratory. According to amount of laboratory work elected (3), (4) or (5). Mr. Schlundt.

135a or 135b. **Radioactivity.** — (Prerequisites, undergraduate courses in physics and chemistry). Lectures, recitations, and laboratory work on the radioactive types of matter and atomic disintegration. (3). Mr. Schlundt.

141a. **Industrial Chemistry.**—(Prerequisite, Qualitative Analysis 27a or 27b, Organic Chemistry 111). Lectures and recitations on the application of chemistry to the purposes of human life as illustrated in the more important arts and industries having a chemical basis for their principal operations and processes. Fuels, water, acids, fertilizers, cements, glass, pottery, paints, gas, explosives, metals, alloys, etc. Additional credit may be obtained in this course by arranging for laboratory work. (3). Mr. Brown.

142b. **Industrial Chemistry.**—(Prerequisites, same as for 141a). Starch, glucose, sugar, fats, oils, soaps, dyes, and other industries. Lectures and recitations. (2) or (3). Mr. Brown.

151a or 151b. **History of Chemistry.**—(Prerequisites, Organic Chemistry 111, and Physical Chemistry 131). May be taken along with course 131. (3).

200. **Chemistry of the Rare Earths.**—Prerequisites, Quantita-

tive Analysis 121). Lectures, recitations, and laboratory work on the occurrence, distribution, properties, and uses of the rare earths. (3). Mr. Brown.

211a and 212b. **Advanced Organic Chemistry.**—(Prerequisites, Organic Chemistry 111). Lectures on selected topics, supplemented by reading and reports on classical researches. (2) or (3). Mr. Calvert.

221. **Advanced Quantitative Analysis.**—(Prerequisite, Quantitative Analysis 121). Chiefly laboratory work. The complete quantitative analysis of rocks, ores, minerals, slags, and various commercial materials and products. The work of the course will be varied to meet the needs of the individual. Credit to be arranged. Mr. Gibson.

231. **Mathematical Chemistry.**—(Prerequisite, Chemistry 131). Lectures on the applications of the operations of the higher mathematics to the study of chemical reactions. (2). Mr. Morlan.

232a and 232b. **Advanced Physical Chemistry.**—(Prerequisites, courses 131 and 121). Lectures on selected topics, supplemented by reading and reports on classical researches. A reading knowledge of German and French is very desirable. Credit to be arranged. Mr. Schlundt.

271. **Research.**—Research work is offered in the various lines of chemistry given in this department. Arrangements for research work should be made by consultation with the professor or instructor whose work is elected.

The University of Missouri Section of the American Chemical Society meets fortnightly for reports on current literature and researches in progress in the University. Students are invited to be present. Fridays at 7:00 p. m.

The students of the department conduct a chemical club which meets fortnightly.

GEOLOGY AND MINERALOGY.

100a. **Economic Geology.**—(Prerequisites, courses 1 or 1a or 1b, and elementary chemistry, and Geology 4b or 5a if the course is taken as graduate work). In this course the origin, mode of occurrence, distribution, uses, methods of obtaining, and conservation of deposits of coal, oil and gas, clays, building stones, cement materials, gypsum, fertilizers, and minor minerals are studied. Field trips to

mines and quarries near Columbia will be made. Students will study in laboratory the materials discussed in the class room. (3). Mr. Tarr.

101b. **Economic Geology.**—(Prerequisites, courses 1 or 1a or 1b, and elementary chemistry, and Geology 5a if the course is taken as graduate work). In this course deposits of the ores of iron, copper, lead, zinc, gold, silver, nickel, aluminum, and the minor metals are studied with reference to their origin, form, geographic distribution, methods of obtaining, production, uses and conservation. Students study in laboratory the main ores of each metal. (3). Mr. Tarr.

102b. **Advanced Physiography.**—(Prerequisite, 1 or 1a or 1b, or 6a or 7b). A lecture, text-book, and conference course intended for those who wish to do advanced work in geology, and for those who expect to teach physiography in secondary schools. The method will be topical and considerable reading will be required. (3-5). Mr. Branson.

103b. **Historical Geology.**—(Prerequisite, course 1 or 1a or 1b. Courses 4b and 6a are desirable antecedents). This course considers briefly hypotheses for the origin of the earth, and more fully principles of sedimentation, distribution and kinds of rocks of each geologic period, geographic changes of the North American continent and causes for geographic changes, and incidentally the climate and life of each period. Several field trips are made for the study of the strata in northern Missouri. (3). Mr. Branson.

104b. **Geologic Life Development.**—(Prerequisites, courses 1 or 1a or 1b and a course in zoology. 103a is a desirable antecedent). This course considers the changes that have taken place in the life of the earth from its first appearance to the present and the causes for these changes. The life of each geologic period is considered first as a whole, and then in its relationships to the life of the preceding and following periods. In the laboratory students examine specimens that illustrate the gradual evolution toward living types. (3). Mr. Branson.

105. **Field Course.**—(Prerequisite, 8 hours of geology). Offered in the summer session. Intended as preparatory for advanced work in geology, and as a basis for the teaching of geology and physical geography. The field work will consist of the making of a topographic map of a small area in the Wind River Mountains, mapping the areal geology, describing the formations, collecting in a systematic way from each formation, and reporting on the structural geology, physiography, and economic products. A more general study will be made of a large area in western Wyoming. Special

topics are assigned to graduate students, and this work may form the basis for master's or doctor's theses. (8) Mr. Branson.

106b. **Petrology.**—(Prerequisites, 4b, 5a, Inorganic Chemistry, and General Physics). The principles of optics as applied to the polarizing microscope and the optical properties of the rock forming minerals are first studied. This is followed by microscopic and megascopic study of the various rock groups. (5). Mr. Tarr.

107a. **Field Geology.**—A course in geological surveying carried on in the vicinity of Columbia. Two afternoons in each week and three whole days (Saturdays) will be spent in the field during the progress of the field work. The field work will be carried on from September to December 1. The reports and maps will be prepared between December 1 and the close of the semester. It is offered as a course in field training for Civil Engineers, Topographers, Geologists, and Soil Surveyors or students who intend to go into work of this kind. Candidates for this course must have had an elementary course in Geology. (3). Mr. Marbut.

108b. **Soils of the United States.**—(Prerequisite, course 2a, 6a, 1a or 1b, in the College of Arts and Sciences). A study of nature, distribution and adaptabilities of the soils of the United States. (3). Mr. Marbut.

109a. **Mineralogy.**—(Prerequisites, 1 or 1a or 1b or 2a or 3b). A study of the elements of crystallography and the general physical and chemical properties of minerals followed by detailed descriptions of the minerals including their mode of occurrence, geographic distribution and origin. The methods of determinative mineralogy, involving the use of the blow-pipe and the consideration of the physical characters of the minerals, are followed in the laboratory. It is the object of the course to make the student familiar with the one hundred and seventy-five to two hundred common minerals. (5). Mr. Tarr.

200a. **Principles of Ore Deposits.**—(Prerequisites, 4b, 5a, 100a, 101b, Chemistry 6a, and General Physics). A consideration of the origin of the deposits of the metals and non-metallic minerals, the principles and chemistry of their deposition, and their metamorphism. (3 or 4). Mr. Tarr.

202a. **Stratigraphic Geology.**—(Prerequisites, 103a and 104b). Lectures, map work, and field work on the stratigraphy of North America, with more intensive study of a limited area. (5). Mr. Branson.

203b. **Paleontology.**—(Prerequisite, 104b. Zoology of Invertebrates and Comparative Anatomy of Vertebrates are desirable antecedents). A somewhat detailed study of a few of the main groups of invertebrates or vertebrates with reference to their evolution and distribution previous to the present period. The content of the course will be varied to suit the needs of individual students. (5). Mr. Branson.

205. **Research Work.**—Offered by members of the department in their respective lines.

MATHEMATICS.

It is especially recommended that students intending to specialize in Mathematics should take courses in French and German in the preliminary work; but an extensive knowledge of the literature of those languages is not necessary.

The courses past course 100 are open only to those who have secured the permission of the instructor in the course. Courses past course 250 are offered for special work by rather advanced students and are given only when specially announced.

100. **Second Course in Calculus.**—This course should be elected by all who have reasonably succeeded in elementary calculus, who desire to continue mathematical work. It will deal with questions necessarily omitted or treated hurriedly in the first course on calculus and will cover approximately the ground indicated by Goursat-Hedrick, *Course in Mathematical Analysis*, including also introductory lectures on sets of points. (3). Mr. Hedrick.

110a and 115b. **The Historical Development of Mathematics.**—This course is designed as an introduction to higher courses in mathematics, and as a comprehensive view of the whole subject for students who will not pursue mathematics farther. It will consider the main problems, the point of view, and the methods, of the principal higher divisions of mathematics, together with an intensive study of typical topics selected from a wide range. The treatment of any topic will be accompanied by a consideration of the larger significant facts in the history of its development. While the two courses 110a and 115b form essentially one course, the latter is so arranged that it may be elected independently of 110a by suitably prepared students with special permission. (3). Mr. Ames.

120a and 125b. **Differential Equations and Their Applications.**—A short time will be spent in the consideration of differential equa-

tions and in the formal solution of some of the simpler types. This will be followed by the careful study and solution of certain problems of geometry, physics, and other sciences in which differential equations occur. Course 125b is arranged to permit of its election independent of 120a by specially prepared students with special permission. (3). Mr. Root.

160a or b. **Probabilities and Statistics.**—This course will cover the fundamental elementary topics in the theory of probabilities, including the theory of least squares; and it will contain a variety of applications of the theory, such as life insurance, statistics, and scientific observations. (2). Mr. Kellogg.

200a or b. **Seminary.**—The members of the staff will conduct work in reading and research in private with students prepared for such work. The nature and amount of the work done may vary materially. The course may be elected repeatedly in different semesters for different work, and for any number of hours sanctioned by the instructor.

205a or b. **Modern Algebra.**—The nature of the course is best indicated by such reference books as Weber's Algebra, and Bocher's Higher Algebra. Alternate years. Given 1911-12. (3). Mr. Westfall.

210a or b. **Differential Geometry.**—Lectures. Introduction to the theory of modern differential geometry. Reference books: Eisenhart; Joachimstahl; Wilczynski; Bianchi. Naturally follows either course 100 or 115b. Alternate years. (Offered 1913-14.) (3). Mr. Ingold.

215a or b. **Projective Geometry.**—Lectures, supplemented by reading. Reference books; Emch; Veblen and Young; Reye; Scott. Alternate years. (Given 1912-13.) (3).

220a or b. **Fourier's Series and Allied Series.**—Introduction to mathematical physics. Lectures, supplemented by reading. Alternate years. (Offered 1911-12.) (3). Mr. Kellogg.

225a or b. **Potential Function.**—Properties of Potential Functions; Boundary Value Problems; and Applications. Continuation of 220a. Lectures, supplemented by reading. Alternate years. (Given 1912-1913.) (3). Mr. Kellogg.

230. **Theory of Functions of Real Variables.**—Higher Analysis, including the most important features of mathematical analysis, in

a comprehensive but elementary manner. Lectures, supplemented by reading. Alternate years. (Given 1912-13.) (3). Mr. Hedrick.

240. Theory of Functions of Complex Variables.—A general course, covering the theories of Riemann, Cauchy, and Weierstrass, in their elementary phases. Theory of Functions of a Complex Variable; Elliptic Functions. Alternate years. (Offered in 1913-14.) (3). Mr. Hedrick.

260a or b. Theory of Groups, with Applications to Galois' Theory and Lie's Theory.—Lectures. (3). Mr. Ames and Mr. Dunkel.

280a or b. Calculus of Variations.—A course on the theory of Maxima and Minima for functions defined on a general range. Emphasis is laid on the applications. References to Hadamard, Bolza and other treatises. Alternate years. (Offered 1913-14.) (3). Mr. Westfall.

Among other courses, the following are offered occasionally, when the needs of the student seem to warrant:

250a or b. Theory of Differential Equations.

265a or b. Theory of Numbers.—(3).

270a or b. Analytical Mechanics.—(3).

275a or b. Partial Differential Equations of Mathematical Physics.—(3).

Mathematical Clubs.—The students of the department conduct, for the discussion of mathematical topics, a club, to which all persons interested are eligible. The members of the staff of the department hold regular meetings for the discussion of current literature and of recent research, which are open also to qualified graduate students.

For other courses on mathematical topics, see, also, the announcements of Physics and of the School of Engineering.

PHYSICS.

Students intending to specialize in Physics should also take Mathematics. Even in the less mathematical courses some knowledge of Calculus is of great advantage.

104a. Electrical Measurements.—Two lectures and three laboratory periods. In the lectures is given an introduction to the mathematical theory of electricity and electrical measurements. The labo-

ratory work consists of such work as comparisons of resistances by Kelvin double bridge and Carey Foster methods; determination of temperature coefficients; comparison of electromotive forces of cells; various uses of the potentiometer; comparison and absolute measurement of capacities; measurement of the coefficient of self and mutual induction; calibration of ammeters and voltmeters; photometric work with incandescent lamps. (5). Mr. Rentschler.

108a and 108b. **Electricity and Light.**—This course is entirely laboratory work and must be preceded by either course 1 or 3. It offers training in the more exact methods of laboratory measurements. The work is entirely individual so that the time may be spent either on optical or electrical problems. In light the work is quantitative, consisting of measurements of wave lengths by interference methods, Fresnel mirrors, interferometers, etc.; determinations of refractive indices; study of resolving power of optical instruments and similar problems. In electricity the work is the same as the laboratory work of course 104a. (1), (2) or (3). Mr. Stewart and Mr. Reese.

106. **Mechanics and Heat.**—A laboratory course similar to 108. (1) or (2). Mr. Reese.

109. **Advanced Work in General Physics.**—This course, largely laboratory work, will be adapted to meet the needs and attainments of individual students. A student may be assigned a definite problem, the literature of which must be studied and the experimental work performed with the care of original research. (2) or (4). Mr. Stewart, Mr. Reese.

110b. **Electricity and Magnetism.**—This course largely descriptive is planned to meet the needs of students who are not prepared to take the more mathematical work of 207. Students desiring laboratory work in connection with this course can elect one or two hours of course 108. Lectures and recitations. (3). Mr. Rentschler.

112a. **Heat.**—(3).

112b. **Light.**—(3).

These courses are open to those who have completed course 3 or 4 or its equivalent. This work is recommended to those who either intend to teach in high schools or desire work more general in character and less mathematical than courses 205, 206, 207 and 215. (3). Mr. Reese.

117b. **Spectroscopy.**—A practical course in the use of various

forms of spectroscopes and the applications to physical problems. Open to those who have had course 1 or 3. (2). Mr. Reese.

Courses 205, 206, 207, and 215 are courses in Mathematical Physics.

205. Theory of Light.—Based on Drude's Theory of Optics. Special attention is given to the electromagnetic theory. Lectures and recitations. (3). Mr. Stewart.

207. Theory of Electricity and Magnetism.—Lectures and recitations. (3). Mr. Stewart.

Courses 205 and 207 will not both be given in the same year.

206. Theory of Heat.—Lectures and recitations. (3). Mr. Reese.

215. Dynamics.—Introduction to the fundamental principles of Mathematical Physics. (3). Mr. Reese.

221b. Electrical Waves.—Theory and applications. (2). Mr. Stewart.

210. Seminary.—Critical reading and discussion of current research work in Physics. A colloquium in which all members of the teaching staff of the department, and students of sufficient attainments take part. (1).

211. Research Work.—Hours to be arranged. Mr. Stewart, Mr. Reese, Mr. Rentschler.

225a and 225b. Recent Developments in Experimental Physics.—Lectures and demonstrations. (1). Mr. Rentschler..

226. Recent Developments in Theoretical Physics.—Lectures and assigned readings. (2). Mr. Reese.

GROUP OF BIOLOGICAL SCIENCES.

ANATOMY AND HISTOLOGY.

105b. Topographic Anatomy.—A study of the topography of the various organs by means of serial sections through the body. Open only to students who have completed the undergraduate courses in Anatomy. Laboratory. (2). Mr. Jackson.

108. Human Embryology.—Based upon a study of human and

other mammalian embryos, especial attention being paid to organogenesis and histogenesis. The elementary courses in Anatomy, Histology, and Embryology are necessary as preparation for this course. Hours to be arranged. Mr. Jackson; Mr. Johnson.

206. **Advanced Anatomy.**—Advanced work in Anatomy or Histology. A seminary, which may be taken separately if desired, is held once a week. Hours to be arranged. Mr. Jackson; Mr. Johnson.

207. **Investigation.**—Problems of original research will be assigned in Anatomy or Histology. A reading knowledge of French and German is required. Hours to be arranged. Mr. Jackson; Mr. Johnson.

BOTANY.

100a. **Plant Physiology.**—Lectures and laboratory work on the physiology of the common cultivated plants, covering such topics as absorption, transpiration, synthesis of carbohydrates and proteins, digestion, translocation, respiration, growth, reproduction and the reaction of plants to stimuli as light, gravity, etc. (3 or 5). Mr. Reed.

102b. **Physiology of the Fungi.**—Lectures and laboratory work on the physiology of the fungi. Special emphasis will be placed on the nutrition of fungi, including methods of isolation and pure culture. Attention is also given to the methods of infection, effect on the host plant, etc., of some of the parasitic forms as rusts, smuts and mildews. This course should be preceded by 2a. (3). Mr. Reed.

103b. **Soil Bacteriology.**—(Prerequisite, Botany 3). A course dealing with the relation of micro-organisms to soil problems. Nitrogen fixation, nitrification, denitrification and the effect of various factors on the number and kinds of organisms in the soil are considered. (3). Mr. Gainey.

104a. **Histological Methods.**—The student will learn the methods used in the preparation and preservation of class material in bulk, and in fixing, sectioning and staining of sections for microscopical study. (2). Mr. Durand.

105. **Comparative Morphology and Embryology.**—A detailed study of the structure and life history of selected representatives of the great groups of green plants. Special attention will be given to tracing the development and homologies of sterile, sporogenous and reproductive parts such as the formation of spores, and gametes, fertilization, the development of the embryo, etc. The nuclear

changes accompanying fertilization and sporogenesis will be followed. This course may profitably be preceded or accompanied by courses 4b, 5a, 6b and 104a. Lectures and laboratory. (3). Mr. Durand.

106b. **Principles of Plant Breeding.**—A discussion of the fundamental principles of plant breeding, including parthenogenesis, hybridization, Mendelian phenomena, etc. Lectures and reports on assigned readings. (3). Mr. Reed.

108. **Diseases of Forest Trees.**—(Prerequisite, Botany 2a). The course takes up a study of the fungous diseases of forest trees, the fungi which cause decay in timber and the methods of timber treatment. (3). Mr. Reed.

200. **Seminar.**—Special subjects of botanical work will be taken up and discussed. For the session of 1913-14 the subject will be the history of plant physiology. In addition the results of investigations carried out in the department will be presented. A reading knowledge of French and German is essential. (1). Mr. Reed.

201. **Research.**—Students who have had adequate preparation will be assigned some special problem for investigation. A reading knowledge of French and German is essential. Credit and hours to be arranged. Mr. Reed, Mr. Durand.

PATHOLOGY.

201. **Advanced Pathology.**—(Prerequisite, Pathological Bacteriology 102a and Pathology 103b.) Choice may be made of either Medical Bacteriology or Pathological Anatomy. The amount and character of the work will depend upon the needs and qualifications of the student. In connection, opportunity will be afforded for practical experience in the handling of all kinds of morbid material. Hours to be arranged. Mr. Dolley; Mr. Mitchell.

202. **Research.**—Opportunity is offered to students sufficiently prepared for original investigation of unsolved problems in the fields of Bacteriology, Pathology and Pathological Physiology. A reading knowledge of German is required and one of French is recommended. A seminary is held once a week. Mr. Dolley; Mr. Mitchell.

203. **Normal and Abnormal Neuro-cytology.**—The application of the general principles and theories of biology to the nerve cell in health and disease. The work will necessarily consist largely of original investigation and will be adjusted to the training of the student. Hours to be arranged. Mr. Dolley.

PHYSIOLOGY.

102a. **General Physiological Chemistry.**—The physiology and physiological chemistry of the proteins; of muscle, nerve and connective tissues; of the cell; of blood, secretion, digestion, absorption, intermediary metabolism, and excretions; of nutrition, heat production, and heat regulation. A metabolism experiment with a quantitative examination of the urine is required. (6). Mr. Gulick, Mr. Kruse.

103a. **Experimental Physiology.**—The physiology of muscle and nerve, circulation, respiration, nervous system, and sense organs. (6).

The laboratory work of this course is open, for three hours credit, to students who present 1b supported by sufficient collateral work in biological or physical science. (3). Mr. Greene, Mr. McVay.

104b. **Advanced Physiological Chemistry.**—A course supplementing and extending course 102a. The preparation and chemistry of the proteins; a qualitative and quantitative study of the tissues and secretions, of enzymes, of putrefaction and putrefactive products; analyses of typical foods, and the detection of food preservatives and adulterants. The prosecution of a short investigation and formal report on the same are required. (4). Mr. Gulick.

105b. **Pharmacology.**—This course presents the physiological action of drugs from the experimental point of view. The demonstrations are made on man and the lower animals. (4). Mr. Greene, Mr. McVay.

107a or 107b. **Toxicology.**—Prerequisites 104b or 105b. (2) or (3). Mr. Gulick.

208. **Journal Club.**—(1). Mr. Greene.

209a. **The Pharmacology of the Circulatory System.**—(3). Mr. Greene.

210. **Advanced Physiology.**—Advanced courses in Physiology, Physiological Chemistry and Pharmacology. Individual problems will be assigned to students of sufficient preparation. Hours to be arranged. Mr. Greene, Mr. Gulick.

211. **Investigation.**—Opportunity is offered for research into questions of current physiological interest. Mr. Greene, Mr. Gulick.

ZOOLOGY.

100a. Embryology of Vertebrates.—The course is designed to lay the foundation of vertebrate embryology. Successive stages in the development of the frog, the chick and the pig are studied from preparations of entire embryos and from serial sections. These observations are used as a basis of comparison for the study of human embryology. (3). Mr. Lefevre, Mr. Tannreuther.

101b. Comparative Embryology of Invertebrates.—A comparative study of the development of representative forms from the principal phyla of the invertebrates, including a consideration of general phylogenetic and morphological problems. (3). Mr. Curtis.

102b. Cytology.—A study of the cell, with special reference to problems of development and inheritance. Cytological technique. (3). Mr. Lefevre.

103a. Experimental Zoology.—A course in zoology, with special reference to the physiological aspect, and including: influence of environment on structure and on life-cycles, response to stimuli, and experiments on growth, regeneration and development. (3). (Not to be given in 1913-14.)

104a. Genetics and Evolution.—A course of lectures dealing with the experimental study of genetics and its relation to the problems of evolution. Emphasis is laid on the phenomena of Mendelian inheritance and the cellular mechanism of heredity. (2). Mr. Lefevre.

200. Research.—Special investigation of unsolved problems of zoology, in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is essential. Hours to be arranged in accordance with the requirements of individual students.

201. Seminary.—Meetings at which subjects of zoological investigation are reported and discussed by instructors and students. Each student is required to give at least four lectures during the year, and experience is thus gained in presenting, in the form of lectures, the results of reading and research. For the session of 1913-14 the following subjects will receive special attention in the work of the Seminary: genetics, and the behavior of organisms. A reading knowledge of French and German is essential. (1).

GROUP OF AGRICULTURE.

AGRICULTURAL CHEMISTRY.

102. **Advanced Agricultural Chemistry.**—This course is a continuation of the regular undergraduate course in agricultural chemistry, which is required of all undergraduate students in agriculture. A critical study of methods in use in the chemical laboratories of the experiment station will be made, including an examination of foods and feeding stuffs for adulteration, etc. This work is planned primarily for those who wish to fit themselves for the work of experiment station and city food laboratories. Elective, three to five periods per week, including one lecture or recitation each week. Hours to be arranged. Mr. Trowbridge, Mr. Moulton and Mr. Haigh.

201. **Seminar.**—(1). Mr. Trowbridge.

202. **Research.**—This course can be elected either as major or minor for advanced degrees, and may include a thesis showing the results of the investigations. The chemical laboratories offer exceptional facilities for research. Subjects may be selected in (a) animal nutrition, (b) composition of animal fats as affected by feeding, age, breed, etc., (c) the composition of meats, feeding stuffs, fertilizers, soils, etc., (d) the chemical problems involved in the dairy industries, (e) the distribution of phosphorus in the animal organism with special reference to the separation of phosphorus compounds, (f) chemical problems involved in the enforcement of State and National pure food laws, (g) the separation of the proteins of flesh and study of their hydrolytic cleavage products. Mr. Trowbridge, Mr. Moulton, Mr. Haigh.

203a. **Chemistry of the Proteins.**—A critical study of the composition and classification and of the decomposition products of the meat and vegetable proteins. Lectures and recitations. (3). Mr. Trowbridge.

AGRONOMY.

200b. **Soil Investigations.**—A study of methods of soil investigation and of special soil problems. Particular attention is given to methods and results of soil investigations in the United States and Europe. One lecture and two laboratory periods a week. (3). Mr. Miller, Mr. LeClair.

201. **Special Investigations.**—Original investigations in soils, crops, or farm engineering. The special work undertaken is determined by the preparation and the needs of the student. Hours to be arranged. Mr. Miller.

202. **Seminar.**—Discussion of various phases of agronomic investigations. Papers on assigned topics are presented for discussion. A reading knowledge of French and German is recommended. (1). Mr. Miller.

ANIMAL HUSBANDRY.

112. **Seminar.**—Special investigation bearing on selected lines in Animal Husbandry. The preparation and presentation of papers for discussion by the class. Twice a week. Elective. Mr. Mumford, Mr. Trowbridge, Mr. Allison.

113. **Experimental Feeding.**—Original investigations of important problems in feeding cattle, sheep and swine. This course is intended to give experience in methods of experimental work and to make the student familiar with the most approved methods of investigation. Elective. Mr. Trowbridge, Mr. Allison.

114. **Research in Animal Husbandry.**—Advanced studies of special phases of Animal Production. Recommended to students who desire more thorough training in the production of cattle, horses, sheep or swine, or who may wish to make a more careful study of the fundamental principles of Animal Husbandry. Mr. Mumford, Mr. Trowbridge, Mr. Allison.

215. **Animal Breeding.**—Research in special subjects bearing on the inheritance and development of characters in the domestic animals. Mr. Mumford.

216. **Zoometry.**—Special investigation of the relations of form and function in the domestic animals. Mr. Trowbridge.

217. **Research in Stock Farm Management.**—Investigations of the principles governing successful systems of stock farm management. Special studies of highly efficient stock farms. Mr. Mumford, Mr. Trowbridge, Mr. Allison.

DAIRY HUSBANDRY.

100b. **Milk Production.**—The breeds of dairy cattle; selection, breeding and development of a dairy herd; care and management

of dairy cattle; feeding for milk production; production of certified and market milk; milk for butter-making and cheese-making; utilization of by-products of the dairy. Mr. Eckles.

201. **Seminar.**—The object of this course is to train the student to do independent work, and to develop the spirit of research. It consists of special investigation and study along selected lines of research with review and discussions of recent work. Each student presents papers on selected topics and reports on recent scientific investigations and on current literature of the subject. Mr. Eckles.

202. **Research in Dairy Husbandry.**—A large herd of highly developed dairy cattle representing four breeds makes it possible to offer facilities for study and investigation on a variety of subjects pertaining to milk production and the care and management of dairy cattle. Students interested in this line are allowed to carry out certain experiments with the dairy animals and in some cases to assist in lines of investigation under way in the Experiment Station. Mr. Eckles.

203. **Special Investigations in Composition of Milk.**—An extended series of investigations is under way regarding the factors that influence the composition of normal milk. A certain number of students are allowed to assist in these investigations and to undertake small problems independently. Mr. Palmer.

204. **Dairy Bacteriology.**—This will be laboratory investigation of certain problems of bacteriology in relation to Dairying, the object being chiefly to give training in methods of research in this line. The work will be adapted largely to the individual student. Mr. Eckles.

205. **Dairy Manufactures.**—Opportunity and facilities are given to study and investigate problems in butter-making, cheese-making and other lines of Dairy Manufactures. Mr. Rinkle.

ENTOMOLOGY.

110b. **Advanced Economic Entomology and Insectary Methods.**—Lectures, laboratory and field work. Open only to students who have taken course 1b or 2a. Credit two hours. Two afternoon periods a week by appointment. Mr. Haseman.

111a. **Morphology, Histology and Development of Insects.**—Open only to students who have taken courses 1b, 103a, and 104b. Credit two hours. Lectures and demonstrations. Mr. Haseman.

200. **Research.**—Opportunity is offered for original investigation of Economic, Morphologic, and Systematic problems presented by our local insects fauna. Mr. Haseman.

FARM MANAGEMENT.

112b. **Farm Administration.**—The application of material gathered in the previous Farm Management courses; fitting general farm management principles to special farms. Making detailed and balanced plans for special farms, considering the handling and management of crops and stock under those conditions. Prerequisite, Farm Organization. Twice a week. (2). Mr. Johnson; Mr. Foard.

114. **Seminar.**—Selected literature and special field investigations of farm management problems, these to be used as the basis for original outlines, and detailed plans for improving systems of farming. Mr. Doane; Mr. Johnson.

201. **Investigation of Types of Farming.**—Field investigations of the different types of farming occurring in a given region, including careful and detailed study of farm practices and incomes. Thesis required. Mr. Doane; Mr. Johnson.

202. **Investigation of Cost of Production and the Distribution of Labor.**—Field investigations of the comparative cost of producing farm products and the distribution of labor on Missouri farms. Thesis required. Mr. Doane; Mr. Johnson.

207. **Investigation of Systems of Farm or Rural Practices and Organizations.**—Original research covering present farm practices and their practical application. Also a study of rural institutions or organizations that directly affect or are related to farm management. Thesis required. Mr. Doane; Mr. Johnson.

HORTICULTURE.

111. **Advanced Pomology.**—A study of the principal species, types and varieties of cultivated fruits and their related forms, together with a consideration of their variations, modifications and adaptations under culture. The living plant collection and preserved specimen on the Horticultural Grounds afford material for the work. Hours by appointment. Mr. Whitten.

113. **Olericulture.**—Exhaustive studies of special groups, species, types and varieties of garden vegetables, together with their cultural requirements and adaptations to special purposes. Mr. Whitten, Mr. Howard.

114. **Ornamental Plants.**—Lectures, laboratory, and assigned readings on the identification and classification of ornamental plants used in Landscape Gardening. The making of herbaria. Prerequisite, Botany 4b; Horticulture 8b. (3). Mr. Major.

115a. **Elementary Landscape Designs.**—Draughting room exercises. Prerequisite, Horticulture 8b, 114. (3). Mr. Major.

215. **Special Investigation.**—This course is intended for graduates and advanced students. Special topics for investigation will be assigned. Hours by appointment. Mr. Whitten, Mr. Howard, Mr. Chandler, and Mr. Major.

VETERINARY SCIENCE.

201. **Topographic Veterinary Anatomy.**—A study of the topographic anatomy of the horse, ox and pig by means of serial cross-sections of preserved cadavers, supplemented by a study of anatomical surface points on the living subject.

This course is designed to meet the needs of advanced students who intend to specialize in Animal Husbandry along the lines of "Stock Judging" and "Meat Production." Course 1a prerequisite. (3). Mr. Connaway.

202. **Contagious, Infectious and Parasitic Diseases of Farm Animals.**—In this course an effort is made to present as many clinical cases as possible, in order that the student may gain a practical knowledge of the clinical features as they are encountered in field experience. Experimental inoculations supplement the clinical study. Autopsies are made and the gross and microscopic lesions studied. The specific causes (bacteria and other micro-parasites and macro-parasites), where known, are isolated and studied. Such ground relating to this group of diseases as has been well covered in the minor course 3a is not repeated in this course. Text and reference books: Friedberger and Froehner's *Veterinary Pathology*, Vol. II, "Infective Diseases"; Law's *Vet. Med.* Vol. IV; Ostertag and Wilcox's "Meat Inspection"; Neumann's "Parasites and Parasitic Diseases"; Nocard and Loclainche's "Les Maladies Microbiennes des Animaux"; Kitt's "Bacterienkunde." Special Bulletins and Veterinary Journals. Lectures, assigned reading, clinics and laboratory work. (3). Mr. Connaway.

203. **Investigation.**—Students who have suitable preparation will have an opportunity to assist in the Experiment Station work. Studies on immunity in relation to hog cholera will continue to be the

principal line of investigation during the coming session. (6). Mr. Connaway.

THEORY AND PRACTICE OF ART.

103. **Theory of Design.** (Prerequisites, course 2a (2b), or its equivalent). The study of design as an art activity fundamental to the fine arts and crafts and a basis for art criticism. The problems of pure design; the relation of the art product to its environment; the relation of the aesthetic to other factors in the work of art; the application of the principles of design to definite problems. Two lectures and one laboratory period a week. (3). Mr. Ankeney; Mr. Carr.

105. **Pictorial Composition.**—(Prerequisite, course 4 or courses 2a (2b) and 103. Exception may be made to students possessing technique of photography). Study and practice in the making of pictures. (2). Mr. Ankeney.

106. **Painting.**—(Prerequisite, course 4 while course 103 is advised in addition.) Style, theory and methods of various schools and movements. Lectures, study of examples and reading. Experimental practice in painting from still life and life with work in original composition. (3). Mr. Ankeney.

107. **Tone.**—An advanced painting course. A close analysis of the composition and relation of tones (value, color quality, intensity), with the equivalents in pigments in interpreting both indoor and outdoor subjects. Two periods a week will be given to work directly under the instructor, in addition to which the student will be expected to paint a great deal alone, bringing in the work for criticism. (3-5). Mr. Ankeney.

208. **Seminary.**—A research course in the processes of the Old Masters with the adaptation of their traditions to modern work. Mr. Ankeney.

HISTORY OF ART.

111. **History of Renaissance Painting.**—First semester: Italian Painting. Second semester: Painting of the Netherlands and of Germany. This course should be preceded or accompanied by European History (History 1a). With Italian Painting, European Culture

and Civilization (History 150a) is also earnestly recommended. (3). Mr. Pickard.

113. **Masterpieces of Architecture, Sculpture, and Painting of Classical, Renaissance and Modern Times.**—Lectures fully illustrated with the stereopticon. This course aims to show the historical development of art by the discussion of some of the finest examples in each of the three divisions mentioned. (1). Mr. Pickard.

216. **Seminary in the History of Art.**—Hours and work to be assigned. Mr. Pickard.

As supplementary to all courses offered in the history of Painting and of Sculpture, Introduction to Art (Theory and Practice of Art) is recommended.

For courses in Classical Archaeology and Art, see page 9.

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UNIVERSITY CALENDAR

AT COLUMBIA.

1913

Summer Session

| | |
|-----------|----------------------------------|
| June 12 | Thursday, Registration. |
| June 13 | Friday, Organization of Classes. |
| July 4 | Friday, Holiday. |
| August 12 | Tuesday, Lectures Close. |
| August 13 | Wednesday |
| August 14 | Thursday |
| | { Examinations. |

First Semester

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| September 15, 16, 17 | Monday, Tuesday and Wednesday, Entrance Examinations and Registration. |
| September 18 | Thursday, at 8 a. m. Class Work in All Divisions Begins. |
| September 18 | Thursday, at 10 a. m. Opening Convocation. |
| October 2 | Thursday, Quarterly meeting of Curators. |
| November 27 | Thursday, Thanksgiving Holiday. |
| December 16 | Tuesday, Annual Meeting of Curators. |
| December 19 | Friday, at 4 p. m. to |

1914

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|------------|--------------------------|
| January 5 | Monday, at 8 a. m. |
| January 24 | Saturday, to |
| January 31 | Saturday |
| | { Christmas Holidays. |
| | { Mid-Year Examinations. |

Second Semester

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| January 29, 30, 31 | Thursday, Friday, and Saturday, Entrance Examinations. |
| February 2, 3 | Monday and Tuesday, Registration, Second Semester. |
| February 4 | Wednesday, at 8 a. m., Class Work in All Divisions Begins. |
| February 5 | Thursday, at 10 a. m., Opening Convocation. |
| April 2 | Thursday, Quarterly Meeting of Curators. |
| April 9 | Thursday, at 4 p. m. to |
| April 15 | Wednesday, at 8 a. m. |
| May 30 | Saturday, to |
| June 6 | Saturday |
| June 7 | Sunday, Baccalaureate Sermon. |
| June 8 | Monday, Class Day. |
| June 8, 9, 10 | Monday, Tuesday, and Wednesday, Entrance Examinations. |
| June 9 | Tuesday, Alumni Day. |
| June 10 | Wednesday, Commencement Day. |
| June 10 | Wednesday, Semi-Annual Meeting of Curators. |

INFORMATION ABOUT THE UNIVERSITY

GENERAL STATEMENT.

The fundamental aim of the University of Missouri is the development of the highest and most efficient type of citizen. For the purpose of attaining its aim, the University furnishes ample facilities for liberal education and for thorough professional training. The University is a part of the public educational system of the State.

ORGANIZATION.

The work of the University is now carried on in the following Colleges and Schools:

- College of Arts and Science
- College of Agriculture
- School of Education
- School of Law
- School of Journalism
- School of Medicine
- School of Engineering
- School of Mines and Metallurgy
- Graduate School
- Extension Division

All of these divisions are at Columbia with the exception of the School of Mines and Metallurgy, which is located at Rolla. In addition, emphasis is given particular lines of work by the establishment of minor divisions, the chief of which are the Agricultural Experiment Station, the Engineering Experiment Station, and the Military Department.

LOCATION.

The University of Missouri is located at Columbia, a town situated half way between St. Louis and Kansas City near the center of the State. It is reached by the Wabash and the Missouri, Kansas and Texas Railways. Columbia is a progressive and prosperous town having doubled its population in the last few years. It has nearly twenty miles of paved streets.

Columbia may be characterized as a town of schools, homes, and churches, with enough of industrialism to make it efficient. It offers the conveniences of a larger city without the counter attractions. The student is a predominant factor in Columbia. He is one to three in numbers. The population of the town is 10,000.

EQUIPMENT.

The University grounds cover over seven hundred acres. The main divisions are in the Quadrangle, the Horticultural Grounds, the Physical Education Grounds, and the Agricultural College Farm.

The following University buildings are located at Columbia: Academic Hall; Laws Observatory; separate buildings for Chemistry, Agricultural Chemistry, Physics, Zoology and Geology; Engineering; Manual Arts; three power houses; Medical Laboratory Building; Parker Memorial Hospital including the Busch Clinic; Agricultural Building; Horticultural Building; Green Houses; Live-Stock Judging, Dairy, Farm Machinery, and Veterinary Buildings, and the Agricultural Farm Barns and Buildings; Switzler Hall, for the School of Journalism; Benton and Lathrop Hall, dormitories for men; Read Hall, the dormitory for women; Rothwell Gymnasium; the houses for the President of the University and the Dean of the College of Agriculture; the High School, and the Elementary School Buildings, used for practice schools in the School of Education.

FOR FURTHER INFORMATION.

For further information in regard to the Graduate School of the University, address

CHAIRMAN OF GRADUATE COMMITTEE,
University of Missouri,
Columbia, Missouri.

Full information regarding the University is given in the catalogue which will be sent on request without charge. For this or special bulletins of the College of Arts and Science, College of Agriculture, School of Education, School of Law, School of Medicine, School of Engineering, School of Journalism, Extension Division, and the Graduate School, write to

DEAN OF THE UNIVERSITY FACULTY,
University of Missouri,
Columbia, Missouri.

THE UNIVERSITY OF MISSOURI BULLETIN

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FOR 1913 VOLUME 14

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| Number 1, January | Summer Session |
| Number 2, February | College of Arts and Science |
| Number 3, March | Graduate School |
| Number 4, April | Catalogue |
| Number 5, May | School of Education |
| Number 6, June | School of Medicine |
| Number 7, July | School of Law |
| Number 8, August | School of Journalism |
| Number 9, September | School of Engineering |
| Number 10, October | College of Agriculture |
| Number 11, November | College of Agriculture (Short Courses) |
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JANUARY

ANNOUNCEMENT
OF THE
GRADUATE SCHOOL
1914-1915



UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
January 2, 1914

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UNIVERSITY OF MISSOURI
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ANNOUNCEMENT OF THE GRADUATE SCHOOL

GENERAL STATEMENT

Admission:

Graduates of the colleges and universities comprising the Missouri College Union and of other reputable colleges and universities are admitted to the Graduate School. Admission to this School, however, shall not be understood as implying admission to candidacy for advanced degrees, which is subject to the regulations indicated below. Students are admitted to the Graduate School by the Dean of the University Faculty to whom applications for admission should be addressed.

Fees and Expenses:

Students are required to pay a library, hospital, and incidental fee of \$10 a semester. Those who enter after the first Thursday of the first semester or the first Tuesday of the second semester must pay an additional fee of \$5 for late registration. Students taking laboratory work must make small laboratory deposits. The estimated cost of room rent and board for students living in Lathrop or Benton Hall, the dormitories for men, varies, according to the room, from \$3 to \$3.50 a week. In Read Hall, the dormitory for women, it varies, according to the room, from \$5.75 to \$6.25 a week. The total necessary expenses of a student living in the dormitories for men need not exceed \$150 a year; for women living in Read Hall, they need not exceed \$250. The necessary expenses for students living in private families vary from \$4 to \$6 a week.

University Fellowships and Scholarships:

The University offers annually a limited number of University Fellowships yielding each a stipend of \$400 a year. These fellowships will be awarded, according as the applicants, irrespective of department, have demonstrated their ability to render service in the form of research. The University offers also a limited number of Scholarships bearing stipends of \$200 annually, open to graduate students of high promise in scholarship, irrespective of the lines of work they may desire to pursue. It is expected that scholars will be well qualified to do graduate work in the subjects which they elect, and that they will devote themselves

mainly to work in these subjects. They will be called upon to render a limited amount of service to the University. University Fellows and Scholars are allowed to engage in outside work only with the consent of the Graduate Committee and the Professor of the subject which they elect. The Executive Board, upon the recommendation of the Committee and Professor, may deprive any student of his fellowship or scholarship, whenever it may appear that he is not devoting himself as he should to his work as fellow or scholar. Applications must be filed not later than March first in order to receive consideration in the award for the following academic year. Applications received after this date and not later than June first will be considered in filling any vacancies that may occur in the fellowships or scholarships. Application blanks may be obtained from the Registrar of the University and when filled out should be sent to the President of the University, Columbia, Missouri.

Curators' Scholarships:

By order of the Board of Curators, the student who attains the highest grade, or who shall be first in merit, in taking a Bachelor's degree, in the graduating class of any of the colleges or universities composing the Missouri College Union, will be admitted to this University for the first year without the payment of tuition, library, hospital, and incidental fees.

Agricultural Research Fellowships and Scholarships:

The University offers annually a limited number of Research Fellowships in the Agricultural Experiment Station, each of the value of \$400, and Scholarships, each of the value of \$200. It is the purpose of these fellowships and scholarships to foster and encourage original investigation and to give opportunity to students who desire to become efficient investigators in the field of agricultural science. All candidates for these fellowships and scholarships must fulfil the requirements for admission to the Graduate School of this University. (See page 3.)

These fellowships and scholarships are available in the departments of Agricultural Chemistry, Agronomy, Animal Husbandry, Dairy Husbandry, Horticulture, Botany, and Entomology. They will be awarded to the candidates who are best prepared and are of the highest promise in scholarship. Application blanks for these fellowships may be obtained from the Director of the Agricultural Experiment Station, Columbia, Missouri. Applications must be filed not later than March first, in order to receive consideration in the award for the next academic year. Applications received after this date will be considered in filling any vacancies which may occur in these fellowships.

Literary and Scientific Societies:

A number of literary and scientific societies are maintained in the University.

The following, conducted by members of the faculties, are open to advanced students: "The Scientific Association," organized with a "General Section" and Special Sections of "Biological Science," "Mathematical and Physical Science," and "Social and Political Science," "The Philological Club," "Mathematical Journal Club," and "The University of Missouri Section of the American Chemical Society."

The following, among others, are conducted by students, in some cases with the participation of members of the faculties: "Medical Society," "Engineering Society," "Der Deutsche Klub," "French Club," "Sketch Club," "Asterisk Club," "History Club," "Branch of the American Institute of Electrical Engineers," "Branch of the American Society of Mechanical Engineers," "Physics Club," and "Forestry Club."

Publications:

The "University of Missouri Studies," several series in "The University of Missouri Bulletin," and the "Publications of the Agricultural Experiment Station" are maintained as a means of publishing the results of original research in the University by instructors and graduate students.

University Libraries, Laboratories, and Museums:

LIBRARIES. The University libraries comprise the general library and many departmental libraries. They contain about 150,000 volumes and pamphlets. Students have access also to the library of the State Historical Society of some 100,000 volumes and pamphlets.

LABORATORIES. Facilities for research in the sciences are provided in the following laboratories: Agronomy, Animal Husbandry, Anatomy, Astronomy, Bacteriology, Botany, Chemistry, Agricultural Chemistry, Dairy Husbandry, Engineering (Civil, Electrical, Sanitary, and Mechanical), Entomology, Experimental Psychology, Educational Psychology, Geology and Mineralogy, Horticulture, Pathology, Pharmacology, Physics, Physiology, Physiological Chemistry, Veterinary Science, and Zoology.

MUSEUMS. There are also museums of Art, Classical Archaeology, Ethnology, Geology, and other collections.

Regulations Governing the Degree of Master of Arts:

The degree of Master of Arts is offered to students who have spent at least one year exclusively devoted to advanced courses of study, and who have submitted an acceptable dissertation and passed all prescribed examinations.

A student wishing to make application for this degree must fill out a blank form, provided for the purpose, and must present it to the Chairman of the Graduate Committee on or before October 15.

In order to be accepted as a candidate for the degree, the student must give evidence that he has completed an undergraduate course of study such as is offered by colleges of good standing and that he has received a baccalaureate degree equivalent to the baccalaureate degree of the University of Missouri.

In making application the student must indicate the subject of the dissertation and the course of study selected by him on the form referred to above, which must bear the signature of approval of the professor in charge of his major subject, before it is presented to the Graduate Committee for its action. He may, however, defer submitting the subject of the dissertation to the Committee until November 1.

The candidate must choose a major subject, to which he must devote the greater part of his time during the year, and also such other subjects as may be approved. A majority of all work represented in the course of study must be selected from the courses strictly graduate in character.

A dissertation evincing capacity for original research and independent thought in the subject of the major work must be submitted to the Committee for approval on or before May 15. The student should consult the Chairman of the Graduate Committee for information regarding the form in which the dissertation must be presented.

Each candidate for the degree of Master of Arts shall be required to pass final examinations, but the Graduate Committee, upon the recommendation of the faculty of the department in which the candidate is taking his major work, may excuse the candidate from the final examinations or from the requirement of a dissertation.

The attention of students is called to the fact that graduate work can not be subjected to rigid regulation and the Graduate Committee reserves the right to deal with each case on its individual merits.

With the approval of the professors concerned, such candidates as have fulfilled all requirements may, at the close of the year, be recommended by the Graduate Committee for the degree of Master of Arts.

Regulations Governing the Degree of Doctor of Philosophy:

1. General Statement.

The degree of Doctor of Philosophy is offered to students who have pursued advanced courses of study, without serious interruption, for a period of at least three years, and who have submitted an acceptable dissertation and passed all prescribed examinations.

In order to be accepted by the Graduate Committee as a candidate for the degree of Doctor of Philosophy, the student must give evidence

that he has completed an undergraduate course of study such as is offered by colleges of good standing, and that he has received a baccalaureate degree equivalent to the baccalaureate degree of the University of Missouri.

The Committee reserves the right to decide in each case whether the antecedent training has been satisfactory, and, if any of the years of advanced work has been passed away from this University, whether they may be properly regarded as spent in university studies under suitable guidance and favorable conditions. Private study, or study pursued at a distance from libraries and laboratories, will not be considered as equivalent to university work. In any case, the student must spend the year immediately preceding his final examinations in residence at the University of Missouri.

It should be emphasized that the requirements for this degree are not computed in terms of time and courses, but that the degree is conferred only upon such students as have reached, after long study, a high attainment in some special branch of learning and have given the clearest evidence of their ability to carry on independent, original research by reason of having made an actual contribution to knowledge of a character approved by competent judges.

2. Acceptance of Candidates.

A student wishing to make application for the degree of Doctor of Philosophy must fill out a blank form, provided for the purpose, secure thereto the signatures of the instructors with whom he desires to take his major and minor subjects and present it to the Graduate Committee for approval on or before October 15. He must also give satisfactory evidence of ability to translate French and German readily at sight.

3. Requirements for the Degree.

(a) Subjects of Study.—Every candidate for the degree must select one principal or major subject, and at least one and not more than two subordinate or minor subjects, the combination to be approved by the Graduate Committee. The instructor with whom the student is taking his major subject acts as his official adviser and has the general direction of his work.

The student's principal work must be in the major subject. Although no regulations are laid down with respect to the time to be devoted to the major and minor subjects, in general it may be stated that the major subject should represent two-thirds of the student's entire time.

(b) Dissertation.—The dissertation, embodying the results of original investigation, must be written upon a subject approved by the adviser and must be submitted to the Committee in typewritten form

on or before May 15, when it becomes the property of the University. The student should consult the chairman of the Committee for information regarding the form in which the dissertation must be presented.

Upon receiving the dissertation a committee is appointed whose duty it is to report upon it in writing to the Graduate Committee.

The candidate is required to print or publish the dissertation, with such revision as the Committee may allow, and he shall present one hundred and fifty copies of the work to the library of the University. The Committee shall take any necessary action to insure the publication of the dissertation within one year after the conferring of the degree. A brief biographical sketch of the writer must be appended to the dissertation.

(c) Examinations.—A committee, consisting of the professor of the candidate's major subject and the professors of his minor subjects, is appointed to take charge of all examinations, and to report upon the same to the Graduate Committee in writing.

In addition to final written examinations the candidate may be required to take an oral examination in the presence of the Faculty.

(d) Conferring of Degree.—Upon the satisfactory completion of all requirements, the candidate may be recommended by the Graduate Committee for the degree of Doctor of Philosophy.

COURSES OF INSTRUCTION

Courses preceded by a number with the letter a attached, thus: 104a, 106a, are given the first semester only. Those preceded by a number with the letter b attached, thus: 104b, 106b, are given the second semester only. Those preceded merely by a number are continuous courses and are given both semesters. The number of hours credit given for a course for each semester is indicated by the Arabic numerals following the statement of the course. Courses numbered 200 and above are strictly graduate in character.

GROUP OF CLASSICAL LANGUAGES

CLASSICAL ARCHAEOLOGY

106. History of Greek Art.—A preliminary study of Assyrian and Egyptian Art, followed by a study of the development of Greek Architecture and Sculpture. Lectures, collateral reading, essays, with constant use of the lantern, photographic reproductions, and models and casts in the Museum of Classical Archaeology. Ancient History is recommended to the students of this course. (3). Mr. Pickard.

107a. Mycenaean Art or Art of Primitive Greece.—The earliest discoveries at Mycenae, Tiryns, and elsewhere will not be neglected, but special attention will be given to the most recent publications on Troy, Crete, and the Argive Heraeum. (1). Mr. Pickard.

108b. Introductory Study of Greek Vases and Vase Paintings.—(1). Mr. Pickard.

While a knowledge of the Greek Language is not an absolute prerequisite for 107a and 108b, these courses are intended for advanced students in Greek.

109. Etruscan and Graeco-Roman Art.—This course should be preceded by course 106. It will deal with the earliest art of the Italian Peninsula, endeavor to show how this art reached its highest development among the Etruscans, how Etruscan influenced early Roman Art, how later Roman Art grew out of early Roman and late Greek Art modified by the circumstances and character of the Romans. Ancient History is recommended to students in this course. (2). Mr. Pickard.

110. Roman Life.—A systematic study of the topography of Rome and of extant remains particularly of Rome and Pompeii. Lectures and readings. Illustrated by the use of plans, maps, and lantern slides. As supplementary to this course, Roman Public and Private Life (Latin 105) is recommended. (2). Mr. Pickard.

214. **Topography and Monuments of Athens.**—Frazer's Pausanias will be taken as the basis of discussion. A reading knowledge of Greek, French, and German is required. (2). Mr. Pickard.

215. **Archaeological Seminary.**—Hours and work to be arranged. Mr. Pickard.

For courses in the History of Art, see page 51.

GREEK

113a. **The Greek Theater.**—The origin and development of the Greek Theater will be considered, and disputed points in the structure of the theater and in the presentation of plays will be discussed. The basis of the work will be Doerpfeld and Reisch's *Das Griechische Theater*. (1). Mr. Manly.

114b. **Aristophanes.**—Selected comedies will be read, and the origin and development of comedy will be considered. Attention will also be given to the life of the people as revealed in the plays. (2) or (3). Mr. Scoggin.

216. **Hesiod and Homeric Hymns.**—Students should provide themselves with *Hesiodi Carmina* ed. A. Rzach, Teubner, Leipzig, and *Hymni Homerici* ed. A. Baumeister, Teubner, Leipzig. (2) or (3). Mr. Hays.

217. **Homer.**—The whole of the Iliad and the Odyssey will be read during the year with especial attention to the antiquities. A special subject will be assigned each student for investigation. Teubner text editions of the poems should be secured in advance. (2) or (3). Mr. Manly.

218a. **Historical Greek Grammar.**—Phonology and Morphology. The lectures will deal systematically with noun and verb inflection within the Greek language itself. The student should procure Brugmann's *Griechische Grammatik* and Solmsen's *Inscriptiones Graecae ad illustrandas dialectos selectae*. (3). Mr. Scoggin.

219b. **Historical Latin Grammar.**—The sounds and inflections of the Latin language will be set forth briefly in lectures. The student should own Lindsay's *Latin Language* and the same author's *Latin Inscriptions*. (3). Mr. Scoggin.

220. **Elementary Sanskrit.**—Elements of the language. Translation of Sanskrit into English and English into Sanskrit. Thorough drill in forms. Whitney's *Grammar*. Lanman's *Reader* and Perry's *Primer*. (3). Mr. Scoggin.

LATIN

104. **Latin Prose Composition.**—(Prerequisite, course 2.) (1). Mr. Hays.

105. **Roman Public and Private Life.**—(Prerequisite, Courses 1 and 6.) (a) Cicero's Letters; (b) Pliny's Letters. (3). Miss Johnston.

Students electing this course are advised to take with it course 190a in History.

106. (a) **Catullus, Tibullus, and Propertius**; (b) **Juvenal and Persius**.—(Prerequisite, Courses 1 and 6.) (3). Mr. Colburn.

109. (a) **Plautus and Terence**; (b) **Lucretius**.—(Prerequisite, Courses 1 and 6.) (3). (Not offered in 1914-15.) Miss Johnston.

110. (a) **Tacitus, Annals**; (b) **Quintilian X-XII**.—(Prerequisite, Courses 1 and 6.) (3). (Not offered in 1914-15.) Mr. Miller.

111. **Rapid Reading**.—(Prerequisite, Courses 1, 6, and 105, or an equivalent.) (2). Mr. Hays.

217. **Seminary**.—The graduate work in Latin centers in the seminary. The first semester of 1914-15 will be devoted to a critical study of Catullus, with interpretations by the members and papers discussing problems connected with the development of Lyric Poetry among the Romans. In the second semester the work will deal with the earliest remains of the Latin language. (2-4). Mr. Miller.

GROUP OF MODERN LANGUAGES

ENGLISH

104. **The Romantic Movement**.—The revolt against classicism in the eighteenth century; the romantic triumph in Scott, Wordsworth, and Coleridge; the radicalism of Byron and Shelley; the neo-classicism of Keats. (3). (Alternates with 109. Not offered in 1914-15.) Mr. Tisdell.

105. **English Literature of the Eighteenth Century**.—First semester: Dryden and Pope. Second semester: Swift and the Essayists. (3). Mr. Belden.

107. **Shakespeare**.—Four or five selected plays; class-room reading and interpretation. A thesis is required. (3). Mr. Fairchild.

108. **Shakespeare**.—The course will be devoted to the history of Shakespeare criticism and to the study of some of the formal elements of the plays (technique, language, versification, etc.). Should be taken in conjunction with or after course 107. (2). Mr. Fairchild.

109. **Tennyson and Browning**.—An intensive study of the poetry of Tennyson and Browning. Lectures and collateral reading in the literature of the Victorian period. (3). Mr. Tisdell.

110. **American Literature**.—(a) Sectional development; (b) growth of nationality; (c) present tendencies. The leading writers in prose and verse will be considered, first, as to their intrinsic worth; and secondly, as illustrative of national development. (3). (Alternates with 105. Not offered in 1914-15.) Mr. Belden.

111. **The English Language**.—An introductory course in linguistic study, taking first the present facts of the language, its sounds, spelling,

vocabulary, inflection, and syntax, and second, its past development through each period, with an introduction to Old English. (3). Mr. Ramsay.

112a. **Anglo-Saxon Literature.**—An early reading knowledge of Old English will be sought, to be followed by rapid reading of a variety of selected texts chosen rather to illustrate Anglo-Saxon life and thought than for intensive phonological study. (3). Mr. Belden.

113b. **Chaucer and His Time.**—The work will center in the study of a considerable number of Chaucer's poems. Reading of selections from a few other representative authors of the fourteenth century. (3). Mr. Rankin.

114. **Modern Prose Writers.**—A study of the works of representative authors, with weekly reports and monthly essays. (3). Mr. Miller.

115. **The English Novel.**—A study of the development of the English novel, by means of lectures and the reading of a selected list of novels chosen to illustrate the development of the type. (3). Mr. Burrowes.

117. **Recent and Current English Literature.**—A study of representative writers and movements of the last twenty-five years, dealing in the first semester with two movements, the New Drama and the Celtic Revival, and in the second with recent poetry, fiction, and essays. (3). Mr. Ramsay.

118a. **English Versification.**—(2). Mr. Miller.

119. **Theories of Poetry.**—Theories of poetry in general, and the application of the principles of criticism to the different literary forms such as the lyric, the epic, and the drama. (2). Mr. Fairchild.

120a and 120b. **Advanced Composition.**—An informal course in practical composition open to a limited number of upperclassmen who make application in advance. (3). Mr. Miller.

126. **The Expository Address.**—A study of structure and style, with special reference to the expository address; collateral reading in oratorical literature; practice in writing and speaking. (2). Mr. Tisdell.

127a. **The Argumentative Address.**—A study of the principles of argumentation; practice in the drawing of briefs and in the writing of forensics; debating. (3). Mr. McEuen.

116b. **Debating.**—Investigation of special questions; practice in debate. Designed especially for members of the debating squad. (This course naturally follows 127a.) (3). Mr. McEuen.

204. **Wordsworth and Coleridge.**—The investigation of special problems. (3). Mr. Tisdell.

206b. **Style and Usage.**—An advanced course in the theory and practice of English composition, involving the investigation of important questions of usage, structure, and style. (3). Mr. Miller.

215. **Beowulf.**—The study of the poem will be pursued as an exercise in Old English phonology, in text-criticism, and in the investigation of poetic principles. (3). (Not offered in 1914-15.) Mr. Belden.

216. **Historical Grammar.**—A selected series of topics in the development of Primitive Germanic, Anglo-Saxon, and Middle English. (3). Mr. Ramsay.

219a or b. **Popular Ballads.**—A study of popular poetry on the basis of Child's English and Scottish Popular Ballads, with analysis of the theories of Gummere, Henderson, Meier, and others, and illustrations from balladry in Missouri. (2). Mr. Belden.

220. **Literary Criticism.**—The history of critical theory will first be traced and the standard works read. This will be followed by more distinctly constructive work in which the problems of criticism will be considered and an attempt made to determine the grounds of literary judgment. (3). (Not offered in 1914-15.) Mr. Fairchild.

222. **The Rise of the Drama.**—From the beginning of the modern drama in the liturgical plays of the tenth century, through the English miracles, moralities, and interludes, to the immediate predecessors of Shakespeare. (3). Mr. Ramsay.

224. **Seminary.**—Elizabethan Drama. Hours and credit to be arranged.

GERMANIC LANGUAGES

104a and 104b. **Masterpieces in Modern German Drama, Lyrics, and Novel.**—Intensive study, from the literary and cultural side, of a number of carefully chosen Modern German dramas, lyric poems, and novels. Parallel reading and reports. (3). Mr. Almstedt.

105a. **Outline Course in German Literature.**—The aim of the course is to acquaint the student with the most important works and movements in the evolution of German literary life. (3). Mr. Hoffman.

106b. **Lessing.**—Lectures on Lessing's life and works; intensive study of Lessing, the dramatist and the critic; essays written in German. Course conducted in German. (3). Miss Stewart.

107. **Schiller.**—This course will consist in the study of Schiller's *Jungfrau von Orleans*, *Maria Stuart*, *Braut von Messina*, *Wilhelm Tell*, *Wallenstein*; essays in German, based on the texts; lectures on Schiller's life and works. Course conducted in German. (3). Mr. Hoffman.

108. **Goethe.**—Lectures on Goethe's life and works; intensive study of Goethe's prose, poetry, and dramas; essays written in German. Course conducted in German. (3). Mr. Almstedt.

109b. **Outline Course in Historical Grammar.**—This course together with 105a is arranged to meet the needs of the prospective teacher of German. Though a knowledge of the older periods is desirable, it is not required. (3). Miss Stewart.

110b. **Advanced Composition and Conversation.**—Advanced course in German theme-writing; discussions of grammatical, syntactical, and stylistic points. This course is intended for teachers of German or for

students who propose to become teachers of German; conducted in German. (2). Mr. Hoffman.

111b. **Middle High German.**—(Introductory Course.) For advanced seniors. The class will study *Der Arme Heinrich* by Hartmann von Aue. Translation into modern German of medieval idiom. (3). Mr. Almstedt.

212. **German Literature of the Second Half of the 19th Century.**—This course will consist of lectures and reports. During the first semester Hebbel, Ludwig, Freytag, and Wagner will be especially emphasized. The minor authors will be treated in lectures. The second semester will be devoted to a study of the realistic writers of Germany, especially Hauptmann, Sudermann, Wildenbruch, and Fulda. The foreign influence on these writers will be carefully considered. (3). Mr. Price.

213b. **Romanticism.**—This course is intended to comprise an exhaustive study, as far as is possible, of German romanticists and their works; and to show the relation of this movement to similar ones in other literatures. (3). Mr. Hoffman.

214a. **The Reformation and Renaissance (1500-1750).**—This course is to give the student a clear view of the development and decline of the literary tendencies, forms, and ideals of this period, and the influences that help to develop them or to accelerate their decline. (3). Mr. Hoffman.

215b. **Middle High German.**—Walther von der Vogelweide. Discipline in phonology, morphology, syntax; comparison of medieval with modern idiom; a study in lyric poetry. (3). Mr. Almstedt.

216b. **History of the Nibelungenlied.**—This course is to comprise a study of the various theories as to the origin and authorship of the poem, the controversies in regard to it, and its relation to the Nibelungensaga and other sagas. A reading knowledge of Middle High German is required. (3). Mr. Hoffman.

217b. **Old High German.**—Phonology and forms; critical reading of Old High German texts. Prerequisite, Course 220a. Texts: Braune, *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*. (3). Mr. Almstedt.

218a. **Old Norse.**—(Prerequisite, Gothic, Course 220a.) Phonology and forms; critical reading of one or more sagas. Texts: Heusler, *Altisländisches Elementarbuch* and Heusler, *Zwei Isländer-Geschichten*. (2). Mr. Almstedt.

219b. **Old Saxon.**—Phonology and forms; critical reading of the *Heliand*. A desirable antecedent: Gothic (Course 220a). (2). Mr. Almstedt.

220a. **Gothic.**—Phonology, morphology, and syntax; reading from *Ulfilas*; the relationship of Gothic to Indo-European and to later Ger-

manic dialects; general introduction to the study of Germanic Philology. (5). Mr. Almstedt.

221. **Current Publications.**—(1). Miss Stewart.

222. **Seminary.**—Subject to be determined. For special students only. (2).

Any other courses in Germanic Languages will be arranged if the needs of the students require.

ROMANCE LANGUAGES

FRENCH

101. **French Phonetics.**—The organs of speech, sound formation, etc.; drill in French pronunciation. (1). Mr. Murray.

104. **Composition and Conversation.**—(Prerequisite, course 3.) Translation into French of standard English; original themes; study of syntax, grammatical problems, style; conversation. (2). Mr. Selbert.

106. **French Literature.**—(Prerequisite, course 3.) A general outline of the various periods; lectures, reading of selected works, critical works, and reports; relation of French literature to other European literatures. (3). Mr. Murray.

107. **French Drama of the Seventeenth Century.**—(Prerequisite, course 106.) The origin and development of classical French drama; its structure, significance, etc.; Corneille, Racine, Molière. (3). Mr. Selbert.

110. **Voltaire and Rousseau.**—(Prerequisite, course 106.) The lives and works of these two great writers of the eighteenth century will be studied, and the attempt made to estimate their influence at home and abroad. (3).

113. **The Romantic School.**—(Prerequisite, course 106.) Its origin in the eighteenth century; foreign influences; the revolt against classicism: its causes and effects; the principal writers of the school. (3). Mr. Mathieu.

115. **Recent and Current French Literature.**—(Prerequisite, course 106.) Study of the development of the modern drama, novel, poetry; criticism from the point of view that some contemporary works will one day become classics; sociological tendencies in the modern drama and novel; symbolists and decadents; the regionalistic movement in the novel; literary criticism as art or science; reading of significant works by Rostand, Richepin, Maeterlinck, Brieux, Bourget, Bazin, Loti, the brothers Margueritte, Verlaine, Henri de Rêgnier, Brunetière, Jules Lemaitre. Lectures, conferences, reports. (3). Mr. Warshaw.

120. **The Language and Literature Down to the Sixteenth Century.**—(Prerequisite, course 106.) Lectures. (1). Mr. Murray.

121. **The Literature of the Sixteenth Century.**—Lectures, reading, reports. (2).

212. **Seminary in French Literature.**—Detailed study of some literary movement or representative writer. (2), (3), or (4). Mr. Murray.

214. **General Introduction to Romance Philology.**—(2). Mr. Murray.

215. **Old French.**—(Prerequisite, course 214.) (2). Mr. Murray.

216. **Seminary in Romance Philology.**—Provençal, Old Spanish, Old Italian. (2). Mr. Cherubini; Mr. Murray; Mr. Warshaw.

ITALIAN

121. **Dante.**—First semester: The forerunners of Dante; *L'Inferno*; second semester: *Il Purgatorio*; *Il Paradiso*. (3). Mr. Cherubini.

122a. **Petrarch and Boccaccio.**—(2). Mr. Cherubini.

123b. **The Poets of the Rinascimento.**—(2). Mr. Cherubini.

124. **Italian Literature of the Nineteenth Century.**—(3). Mr. Cherubini.

125. **Composition and Conversation.**—(2). Mr. Cherubini.
Italian Philology.—See courses 214 and 216.

SPANISH

132. **The Spanish Drama.**—The reading of representative plays by Echegaray, Núñez de Arce, Gil y Zárate, Tirso de Molina, Lope de Vega, Calderón, etc.; the study of the playwrights of the Golden Age will alternate with that of the modern playwrights; discussion of the spirit and technique of the Spanish drama and of its influence on the drama of other countries; constant exercise in the practical use of the language will be afforded; lectures, conferences, reading. (2). Mr. Warshaw.

233. **Seminary in Spanish Literature.**—Detailed study of some literary movement or representative writer. (2). Mr. Warshaw.
Spanish Philology.—See courses 214 and 216.

GROUP OF PHILOSOPHY AND EDUCATION

EDUCATION

110a. **Educational Psychology.**—(Advanced Course.) This course aims to give a thorough treatment of a few of the most important phases of mental development, and is adapted both to those who have had an elementary course in this field and to those who have had an extensive course in general psychology without reference to educational problems. (3). Mr. Pyle.

111b. **Scientific Testing of Methods.**—It is the purpose of this course to apply the results of psychological investigations to the problems of the school room in examining and testing methods of teaching, the classification and grading of pupils, the determination of individual types and ca-

pacities, and in ascertaining the characteristics of the learning process. Prerequisite, 110a or its equivalent. Lectures and laboratory work. (3). Mr. Pyle.

112a. **The Abnormal Child.**—A study of subnormal and supernormal children from the standpoint of genetic psychology. Examination of the causes of these deviations, tests for their determination and a study of their proper treatment. (1). Mr. Pyle.

113. **Current Problems.**—A study of current problems in education from the point of view of psychology. Informal discussions and reports of periodical literature in educational psychology. The object of this course is to acquaint the student with present-day educational problems and give a basis and perspective for their scientific consideration. (1). Mr. Pyle.

120. **History of Education.**—The purpose of this course is to give a better understanding and appreciation of present educational tendencies by tracing historically those educational movements which have been most effective in determining the present educational situation or are typical or prominent aspects of it. (2). Mr. Coursault.

121a. **Educational Classics.**—An intensive study of the historical setting and content of a few educational classics which mark prominent movements in the development of educational thought and practice. (3). Mr. Coursault.

130a and 130b. **Theory of Teaching.**—A general course which aims to formulate a method of class work, and to illustrate as fully as time will permit its application to subjects in all grades of school work. (3). Mr. Charters.

148. **Statistical Studies in Theory of Teaching.**—(Prerequisite: Education 130a or its equivalent.) The application of statistical methods to the improvement and testing of methods of teaching. (3). Mr. Charters.

150a. **School Supervision.**—A study in the principles of school supervision, in which emphasis is laid upon the relation between superintendent, supervisors, teachers, and pupils. Practical problems such as attendance, classification, government, reports, exhibits, will be briefly considered on the basis of this relation. The course consists largely of observational studies in the University Schools. (2). Mr. Meriam.

150b. **Supervision of Instruction.**—A study in the principles and practice of class criticism, arranged for superintendents, principals, and supervisors in public schools and normal schools. Outlining studies, providing materials of instruction, helping pupils study, determining upon tests of efficiency, are the leading problems in the course. Laboratory work, supervising in the University Schools, is a part of this course. (3). Mr. Meriam.

151. **Elementary Education.**—A study is made of the function of the elementary school in modern life and the nature of the curriculum needed to meet this aim. Elementary problems of school management and current methods of teaching reading, arithmetic, geography, etc., are studied. This course is planned for those preparing for special work in teaching or supervising in elementary schools, and includes much observation and laboratory work in the University Elementary School. (1), (2), or (3). Mr. Meriam.

160b. **School Economy.**—A course in effective methods of school management from the standpoint of the teacher in secondary schools. (2). Mr. Elliff.

161b. **School Administration.**—A general treatment of the important administrative problems of principals and superintendents in small city school systems, for which the class meets twice a week. The third hour of credit will be given for individual practice work in the investigation and solution of practical problems involved in the administration of the University High School, the University Elementary School, and the Columbia Public Schools. (2) or (3). Mr. Elliff.

163a. **High School Administration.**—(Prerequisite, Education 2a and 120 or equivalent.) A consideration, from the standpoint of the administrator, of the main problems now confronting secondary education in the United States, with special reference to conditions in Missouri. The principal topics considered are: Relation of high school to elementary school, college, and community; organization and direction of teaching staff; equipment; government; reorganization of curriculum with special attention to vocational training, physical education, and social life of high school; elimination of pupils; keeping, interpretation, and use of high school statistics; financing of secondary education. Open for credit only to superintendents, high school principals, and experienced high school teachers. (2). Mr. Elliff.

170b. **Principles of Education.**—The purpose of this course is to reveal the fundamental principles upon which educational procedure should rest. Such topics as the following are considered: The relation of the individual to society; the ways in which the individual acquires ideas and ideals; the development of character and of knowledge and appreciation of the world; the values of the sciences, history, literature, etc.; the nature of social development; the fundamental ideas underlying the selection of the curriculum and methods of teaching; the relation of the various points of view from which education is studied. (3). Mr. Coursault.

180a and 180b. **Practice Teaching.**—Hours and credit must be arranged with the instructor before registration. Application should be made in the semester preceding that in which this course is wanted. Mr. Meriam.

210. **Seminary in Educational Psychology.**—The special problems selected for study will depend upon the interest of those taking the course,

the aim being to guide advanced students of Education in constructive work in the theory of education through a detailed study of a few aspects of mental development. The course is open only to students who have had considerable training in both education and psychology. For thesis work. Credit to be arranged. Mr. Hill and Mr. Pyle.

211. Research Course in Educational Psychology.—Original investigation of problems in mental development or in any field of educational psychology. Open only to students who have had training in both general and educational psychology, including training in psychological method. Credit to be arranged. Mr. Pyle.

220. Seminary in the History of Education.—A critical investigation of topics in connection with the thesis work for the graduate degrees. Mr. Coursault.

221b. History of Education in the United States.—A research course for advanced students. (2). Mr. Coursault.

230. Seminary in Theory of Teaching.—An intensive study of some problems in theory of teaching. The problems selected will depend in part upon the interests of the students. Considerable use is made of psychology and history of education, satisfactory work in both being prerequisite to this course. (3). Mr. Meriam; Mr. Charters.

231. Research Course in Theory of Teaching.—An intensive study of certain problems in theory of teaching, the selection of which is largely dependent upon the interest of the class. Primarily for students not in residence who are working upon special problems. Credit to be arranged. (3). Mr. Charters.

250. Seminary in School Supervision.—An intensive study of problems in connection with thesis work for graduate degrees. Opportunity is offered for experimental work in the University Schools. Mr. Meriam.

251. The Public School Curriculum.—Research work on courses of study for elementary schools and for high schools. A close examination is made of typical curricula in schools of this country and foreign countries; also curricula of special schools. Study is made of the development of the curriculum to meet changing social and industrial conditions in community and national life, and to comply more adequately with the psychological development of the pupil. (3). Mr. Meriam.

260b. Seminary in School Administration.—A research course in school organization and administration with special reference to city school systems. The course is to be taken only in connection with thesis work for the graduate degrees. Mr. Elliff; Mr. Meriam.

270. Seminary in Philosophy of Education.—An intensive study of Philosophy of Education made in connection with thesis work for the graduate degrees. Mr. Coursault.

271. Philosophy of Education.—This course begins with a critical study of the origin and nature of some of the traditional fundamental be-

liefs that seriously affect the consideration of educational problems, and leads to a systematic treatment of the fundamentals of education in the light of modern science and philosophy. The ideas acquired are then used in the interpretation and criticism of a variety of modern contributions to educational thought and practice. (3). Mr. Coursault.

In addition to the above, a number of courses in the teaching of Botany, English, German, etc., and in the administration of school subjects are offered and may be counted as Education for the degree of Master of Arts.

For a statement of these courses, see the announcement of the School of Education in the General Catalogue.

EXPERIMENTAL PSYCHOLOGY

These courses are open only to students who have had an introductory course in General Psychology.

103a or b. **Graphology.**—The manifestation of individual characteristics in peculiarities of script. Methods of identifying individual handwriting and of discovering forgeries. (3). Mr. Meyer.

104a or b. **General Esthetics.**—An experimental as well as theoretical study of the psychological laws underlying our appreciation of the beautiful, chiefly in the arts of painting, sculpture, and architecture and also in nature. No familiarity with the technique or history of art is required. The aim of this course is to develop in the student an independent judgment in questions concerning the beautiful. (3). Mr. Meyer.

105a or b. **Theory of Music.**—The esthetic laws of music. The psychological differences between primitive and highly developed music, and between European and exotic music. (3). Mr. Meyer.

106a or b. **Principles of Psychology.**—Discussion of the general principles of scientific investigation. Application of these principles in the criticism of modern psychological theories and problems. (3). Mr. Meyer.

108a or b. **Abnormal Psychology.**—The abnormalities of mental life resulting from inborn, pathological or artificial causes (such as idiocy, aphasia, apraxia, somnambulism, hypnosis, etc.) and their educational, medical, and forensic significance. (2). Mr. Meyer.

109a or b. **Psychological Systems.**—A comparative study of the psychological systems as found in the chief text-books on psychology issued during the last thirty years. (4). Mr. Meyer.

211a or b. **Psychological Seminary and Advanced Laboratory Work.**—Critical reading of recent literature. Discussion of special problems and theories. Research work. Mr. Meyer.

PHILOSOPHY

103a. Ethical Theory.—An introductory study of the main problems of ethics and of the chief methods of their solution, with constant reference to the principal historic schools for illustration and interpretation. The following topics will be included: the nature and method of ethics as a philosophical discipline; freedom; the ground of obligation; conscience; egoism and altruism; optimism and pessimism; hedonism; utilitarianism; intuitionism; self-realization. (3). Mr. Hudson.

104a. History of Ancient and Medieval Philosophy from the Ionian Schools to Bacon.—The work of the course will include a careful reading of the greater part of Plato's Republic. Lectures, required reading, oral and written reports. (3). Mr. Hudson.

104b. History of Modern Philosophy from the Renaissance to the 19th Century.—Lectures, class-room discussions, required reading, written reports. (3). Mr. Rogers.

105b. Contemporary Tendencies in Metaphysics.—A consideration of representative systems, issues, and controversies of the present day, together with their general relations to historic philosophy. Stress will be laid upon the problems and tendencies characteristically modern in their setting, such as those aroused by the development of modern science. Lectures, required reading (including reference to the principal philosophic journals), reports, and conferences. Open only to those who have had 104b or its equivalent. (3). Mr. Hudson.

109a. Philosophical Ideas in English Literature.—An untechnical account of the main tendencies which have influenced popular thought in recent times. It will deal with such men as Wordsworth, Shelley, the Utilitarians, Spencer, Arnold, Carlyle, Tennyson, Ruskin, Emerson, Stevenson, and others. In the last part of the semester contemporary writers will occupy a considerable portion of the time. Lectures, reading, and discussion. (3). Mr. Rogers.

110a. English Scientific Naturalism.—A study of the presuppositions underlying the views of Mill, Spencer, Huxley, and others of their contemporaries, and their application to philosophical problems. Reading, reports, and discussion. (2). Mr. Rogers.

112b. American Ideals.—A study of the ethical interpretations of life implied in American social and political institutions. (3). Mr. Hudson.

230. Seminary.—Subject to be determined. Two or three hours credit according to the amount of work done. Mr. Rogers and Mr. Hudson.

GROUP OF HISTORY AND POLITICAL SCIENCE

ECONOMICS

105a and b. **Money, Credit, and Banking.**—This course involves a study of the relation of the production of the precious metals and the banking business to the supply of money and the prices of commodities. An inquiry is also made into the organization and operation of the banking business in the leading nations with special reference to its bearing on loan and discount rates and the development of business. (5). Mr. Stewart; Mr. Ardzrooni.

106a or b. **Economics of Transportation.**—A history of the development of transportation agencies, and a study of the principles of rate-making and rate-regulation. (3). Mr. Huse.

107b. **Economic History.**—The American people in their advance from the simple economic life of colonial days to the complex activities of the present; the development of industry, commerce, transportation, finance, money and banking, and labor organization. The economic movements in other countries will be considered wherever they have had important influence on American development. (5). Mr. Huse.

108a or b. **Insurance.**—The general principles, the different forms of personal and property insurance, and the main problems connected with each. (2). Mr. Davenport.

109a or b. **Crises and Depressions.**—The recurring periods of activity and inactivity in business known as prosperity, crises, and depression. The causes and effects of these fluctuating movements are sought by an analytical study of recent business cycles. (2). Mr. Stewart.

110a or 110b. **Problems of Labor.**—A study of the special problems and interests of wage earners, such as the organization and policies of trades-unions, employers' associations, arbitration, profit-sharing, factory acts and other forms of labor legislation. (3) to (5). Mr. Huse.

112a or b. **Tariffs, Trade, and Shipping.**—A study of the development of our commercial policy and the influence of tariff legislation upon the development of our domestic industries. A discussion of trade policies of the chief commercial nations of Europe, with special reference to the negotiation of reciprocity treaties, including the study of attempts to build up American shipping through legislative grants of subsidies. (2). Mr. Ardzrooni.

115a or b. **Public Revenues.**—A critical examination of (1) The various theories as to the limits of state activity; (2) Various ethical systems as related to the problem of Justice in Taxation; (3) Proportional vs. Progressive Taxation; (4) The later developments in Value Theory as bearing on the more difficult problems of Incidence; (5) The adminis-

trative aspects of Income Taxation; (6) Ethical, legal, and constitutional aspects of Franchise and Corporation Taxation; (7) The practicability of a scientific articulation of the various taxes under American conditions. (3) to (5). Mr. Davenport.

116a. **Corporation Finance.**—Describes the purposes and methods pursued in the organization and management of business corporations and the uses and character of corporation securities as related to the investors and to the corporation's management. (2). Mr. Veblen.

117a or b. **Accounting.**—This course treats of the construction and interpretation of the accounts of the private business, the partnership, and the corporation. It involves a study of the use of the income account and balance sheet in connection with the capitalization and valuations of property, and the relation of cost accounts to business and industrial efficiency. (3) to (5). Mr. Comer; Mr. Scott.

118a or b. **Trusts and Combinations.**—This course treats of the development of business organizations, the financing of such enterprises, their relations to the control of industry, the prices of commodities and the distribution of wealth. (3) to (5). Mr. Veblen.

119a or b. **Accounting and Business Policy.**—A hasty survey of the genesis of the balance sheet, and intensive study of cost accounting, and the interpretation of the balance sheets of industrial corporations as pointing the way to sound business policy. (3). Mr. Comer; Mr. Scott.

211. **Advanced Economic Theory.**—A critical examination of the writings of the leading economists from the time of Adam Smith to the present to the end of constructing a correct theory of value and distribution. A survey of the theoretical aspects of the science. Credit to be arranged. Mr. Davenport.

212. **Seminaries.**—Credit to be arranged. Mr. Davenport, Mr. Huse, Mr. Veblen.

213a or b. **Statistics.**—The rudiments of statistical methods based upon a study of sources and collection of statistical data, census reports, forms of averages and their proper uses, together with the graphic and tabular presentation of results. (3).

214. **History of Economics.**—A first-hand study of authors and documents, with especial reference to the background of political and industrial conditions and of philosophical thought. (2) or (5). The student is advised to correlate this course with related courses in Philosophy, Political Science, History and Sociology. Mr. Veblen.

219. **Economic Factors in Civilization.**—An inquiry into institutions as affected by economic conditions with a view particularly to early European civilization. (2) to (5). Mr. Veblen.

232a or 232b. **Socialism.**—A consideration of the essential features of the socialistic program from the standpoint of economic and sociological theory. An examination will be made of some of the writings

of representatives of different types of socialistic thought. Particular attention will be given to those of Karl Marx and of the leaders of modern French and German Socialism. (2) to (3). Mr. Ardzrooni.

HISTORY

100b. **Recent European History.**—The political, social, and institutional history of the chief European countries since 1815 will be carefully studied with a view to present conditions. (5). Mr. Church.

115a. **Modern England.**—A course dealing with the internal and external problems of England and the British Empire since 1660. (3). Mr. Trenholme.

120b. **English Constitutional History.**—An advanced English History course dealing with the growth of English government and law as a background to present conditions in the British Empire and America. (3). Mr. Trenholme.

135a. **Oriental History (to 600 A. D.).**—Political and social history of the early Oriental peoples of Assyria, Babylonia, Egypt, and Israel; Greece and Rome in their relations with the Orient. (3). Mr. Olmstead.

135b. **Oriental History (600-1900).**—A study of the political and social aspects of the rise of Islam with special emphasis on the relations between Western Asia and Europe. (3). Mr. Wrench.

The two preceding courses, though they may be taken separately, together form a complete survey of the history of Western Asia.

140b. **American Social History.**—A survey of the development of American society, with emphasis on the economic and social progress since the Revolution. (3). Mr. Stephens.

150a. **European Culture and Civilization—the Middle Ages.**—A careful study of the blending of the Graeco-Roman, German, and Christian elements of culture during the early medieval periods, and a study of their development in the later medieval periods. (2) or (3). Mr. Wrench.

155b. **European Culture and Civilization—the Renaissance.**—An examination into the causes and character of European culture and civilization during the thirteenth, fourteenth, and fifteenth centuries. Should be preceded by 150a or equivalent. (2) or (3). Mr. Trenholme.

160a. **The French Revolution and the Napoleonic Era.**—Lectures, with discussion, based on text and collateral reading, on the political history of the period. (2) or (3). Mr. Church.

165b. **The Reformation.**—A study of the Protestant Revolt and of the forces which it released. (2) or (3). Mr. Church.

170a. **History of the West.**—A study of the westward movement of population, the economic, social, and political development of the west, and the reaction of western ideals and influences on United States history. (3). Mr. Maurer.

175b. Recent United States History.—A course in the history of the United States since 1865, from the point of view of the historical background of present day problems. (3). Mr. Maurer.

180a. History of Missouri.—The primary aim of this course will be to give an account of the development of Missouri since 1803. (1). Mr. Viles.

185a. The Crusades.—A course dealing in an intensive way with the crusading movement in both its western and eastern aspects. (2) or (3). Mr. Wrench.

190a. The Roman Revolution.—An advanced Ancient History course consisting of a detailed study of the internal history of Rome during the years 133 to 31 B. C. (2) or (3). Mr. Olmstead.

200. Historiography and Historical Method.—A course of training for students intending to do advanced and graduate work in history. (1) or (2). Mr. Trenholme, assisted by the other members of the department.

210. Seminary in Ancient History.—Rome and Carthage; the Punic Wars and their historians, Polybius and Livy. (2) or (3). Mr. Olmstead.

230. Seminary in American Political Government and History.—For the year 1913-14 the general topic for investigation will be the development of political parties, 1815 to 1840, with especial attention to the social and economic factors and to the political leaders. (2) or (3). Mr. Maurer.

240. Seminary in English Constitutional and Legal History.—A graduate research course in English constitutional and legal history. (3). Mr. Trenholme.

250. Seminary in Historical Research and Thesis Work.—A course giving opportunity for research and thesis work along special lines. Primarily intended for candidates for graduate degrees. The work of the student will be under the direction of the instructor most interested in the field in which the topic of special research lies. (1), (2), (3) or (4).

POLITICAL SCIENCE AND PUBLIC LAW

103b. Elements of Jurisprudence.—An introduction to the study of law. This course treats of the nature, sources, and classification of law, and includes a consideration of the fundamental concepts of private law. The nature and use of legal authorities will be discussed. (2). Mr. Loeb.

104a. European Governments.—A descriptive study of the constitutional organization and practical working of the principal governments of Europe; with considerable attention to political parties and current political questions. (3). Mr. Shepard.

105b. Comparative Constitutional Law.—A comparative study of the legal and theoretical basis of the modern state, the various forms of government and the structure and function of the principal governmental organs. (3). Mr. Shepard.

106b. **Municipal Government.**—A comparative study of the organization, functions, and administration of cities of Europe and the United States. During the latter part of the course special topics will be taken up in more detail, such as: central control over cities, municipal elections, municipal revenue, the regulation of public utilities, and municipal ownership. (2). Mr. Loeb.

107a. **Party Government.**—A study of the theory, organization, methods of action and functions of political parties, with special emphasis upon the party-system of the United States. (2). (Not given in 1914-15.) Mr. Shepard.

201a. **Colonial Government.**—A study of the present government and administration of the colonies of the United States and of other countries. (3). (Not given in 1914-15.) Mr. Shepard.

202a. **International Law.**—A general treatment of the law governing international relations in peace and war, with considerable attention to the development of arbitration and international organs of administration. (3). Mr. Shepard.

204. **Constitutional Law of the United States.**—Particular attention will be given to the field of individual liberty defined in the Constitution of the United States and interpreted in the decisions of the Supreme Court. (3). Mr. Loeb.

208b. **The Government of Missouri.**—A study of the constitutional development of the state from the Louisiana Purchase to the present time, followed by a consideration of the organization and functions of the institutions of the central and local governments. (2). (Not given in 1914-15.) Mr. Loeb.

209b. **The Law of Taxation.**—A study of the legal rules regulating taxation in the central and commonwealth governments of the United States. The student is advised to correlate this course with related courses in Economics. (2). (Not given in 1914-15.) Mr. Loeb.

210. **History of Political Theories.**—A study of the development of political thought in its relation, as cause and effect, to political action, from the period of antiquity to our own day. (2). Mr. Shepard.

220. **Seminary.**—Credit to be arranged. Mr. Loeb; Mr. Shepard.

SOCIOLOGY

110a. **Social Pathology.**—A study of the origin, nature, and treatment of the dependent and defective classes. As causes of poverty and degeneracy are studied physical and mental abnormalities, the unequal distribution of wealth, low wages and standards of living, unemployment, etc. As remedial and preventive agencies are studied educational and legislative measures, social reform movements, eugenics, public and private relief, organized charity, almshouses and other institutions for dependents

and defectives, etc. Text-book work and assigned reading and papers on special topics. (3).

111b. Criminology.—A study of the causes, nature, and treatment of crime; the principles of criminal anthropology and psychology, criminal jurisprudence, and penology. Among the topics treated are criminal statistics, the social causes of crime, criminality and degeneracy, female and juvenile criminality, the evolution of criminal law, the reform of criminal procedure, prison systems and the county jail, the industrial reformatory, the indeterminate sentence, prison labor, probation and parole, the treatment of the juvenile offender. Lectures and assigned reading. (3).

112b. Preventive Philanthropy.—An intensive study of some specific problems in preventive work, including a study of child problems, playgrounds, child labor, and the juvenile court. (2).

115a. Rural Sociology.—A study of social conditions in rural life. Among the topics considered will be the statistics and movements of rural population, the physical environment of rural life, isolation and means of communication, rural occupations, co-operative organizations among farmers, the family and woman's position in rural life, the country school, the country church, etc. The movements for the improvement of rural life will be considered. Lectures, assigned reading, and papers. (2).

116b. Urban Sociology.—A study of social conditions in urban communities. The origin and growth of cities will be considered. An intensive study will be made of educational, political, moral, social, aesthetic, and religious forces and institutions in urban life. Municipal reform movements will be considered. Lectures, assigned reading, and papers. (2).

125. Anthropology and Ethnology.—A study of the origin and evolution of man as an animal and of the early stages in cultural evolution. Among the topics considered will be the prehistoric human types, the characteristics of the Negro, Mongolian, American, and Caucasian races, the beginnings of human culture, the stone and metal ages, the origins of the division of labor, language, magic, religion, moral ideas, science, art, and of social organization in the family, horde, clan, and tribe. Lectures and assigned reading. (3).

220a. The Principles of Sociology.—A critical study of sociological theory. The sociological theories of recent writers, such as Tarde, Ross, Giddings, and Hobhouse, will be critically examined with a view to laying the foundations for a constructive theory of the social life in modern Biology and Psychology. Discussions and papers by the class. (3).

221b. Biological Sociology.—A course on the biological basis of sociology. Among the topics treated will be the relation of organic to social evolution with special attention to heredity; selection, adaptation, and variation, the beginnings of social evolution in the animal world, and the instinctive, emotional, and intellectual forces for association. Lectures, assigned reading, and research work. (2).

222a. **Social Statistics.**—Statistical methods for the investigation of problems in social science will be studied. The principal statistical investigations which have so far been made will be analyzed and one or more problems will be given to each student to furnish practice in quantitative treatment. Lectures, assigned reading, and research work. (2).

226. **Ethnic Psychology.**—A study of the comparative psychology of races as shown in their customs, institutions, and social organization. (Not given in 1914-15.)

227a. **The Negro in America.**—A study of the social, economic, moral, and educational conditions among the negroes of the United States. The work will consist of lectures, library work, and theses. Students will be admitted only after consultation. (3). (Not given in 1914-15.)

230b. **History of Social Philosophy.**—Lectures on the development of social thought from Aristotle to the present. The social philosophies of Plato, Aristotle, St. Augustine, Thomas Aquinas, Machiavelli, Bodin, Hobbes, Locke, Vico, Montesquieu, Rousseau, Condorcet, and the sociological systems of Comte, Spencer, Shaeffle, Lilienfeldt, Gumplowicz, Ratzenhofer, and Ward will, among others, be considered. A large amount of assigned reading will be required in this course. The student is advised to correlate this course with related courses in Economics, History, Political Science, and Philosophy. (3).

231a. **History of Philanthropy and the Poor Law.**—A study of the development of legislation governing, and methods of administering public relief in England and America, and the parallel account of voluntary charitable institutions and methods. (2).

232a or b. **Socialism.**—See announcement under Economics.

240. **Seminary.**—Research work upon special problems in sociology and philanthropy. Two, three, or four hours' credit will be given according to the amount of work.

GROUP OF MATHEMATICAL AND PHYSICAL SCIENCES

ASTRONOMY

105b. **Modern Astronomy.**—A study of the problems and aims of modern astronomical science; its relation to other sciences. Frequent references to current literature of astronomy. (3). Mr. Baker.

106a and 106b. **Advanced Astronomy.**—Subjects are selected to meet the requirements of individual students. Credit to be arranged. Mr. Baker or Mr. Kiess.

107a. **Advanced Practical Astronomy.**—Theory and use of the equatorial telescope as an instrument of precision; its auxiliaries: the micrometer, the photometer, the spectroscope. Applications of the method of least squares. (3). Mr. Baker.

108b. **Theoretical Astronomy.**—Integration of equations of motion. Determination of parabolic and elliptic orbits; construction of ephemerides. Application to comets, planets, and binary stars. Credit to be arranged. Mr. Kiess.

209. **Astrophysics.**—The application of physical principles to astronomy. Methods and results, with their bearing on solar and stellar phenomena. Studies in photometry and radial velocity. Credit to be arranged. Mr. Baker; Mr. Kiess.

220. Research.

CHEMISTRY

111. **Organic Chemistry.**—Lectures, recitations, and laboratory work. (3). Mr. Calvert; Mr. Jones; Mr. Black; Mr. Yancey.

112a. **Preparation of Organic Compounds.**—A laboratory course in synthetic organic chemistry. May be taken with course 111. (2) or (3). Mr. Calvert; Mr. Wise.

113b. **Preparation of Organic Compounds and Organic Analysis.**—Laboratory Course. (3), (4), or (5), according to the amount of work elected. Mr. Calvert; Mr. Wise.

121. **Quantitative Chemical Analysis.**—The general principles of gravimetric and volumetric analysis. Laboratory work and lectures. (3). Mr. Gibson.

122a. **Technical Analysis.**—(Prerequisite, Quantitative Analysis 121.) Gas, water, and fuel analysis. Required of chemical engineers. (3). Mr. Gibson.

123b. **Technical Analysis.**—(Prerequisite, Quantitative Analysis 121.) The analysis of commercial products of an inorganic character. (3). Mr. Gibson.

125a. **Quantitative Organic Analysis.**—(Must be preceded or accompanied by Quantitative Analysis 121.) Quantitative analysis of commercial organic products, such as alcohols, aldehydes, organic acids, glycerine, oils and fats, carbohydrates, petroleum products, soaps, etc. (3). Mr. Calvert; Mr. Wise.

126b. **Quantitative Organic Analysis.**—A continuation of 125a. (3). Mr. Calvert; Mr. Wise.

127. **Advanced Qualitative Analysis.**—(Prerequisite, Qualitative Analysis 27a or 27b.) The complete qualitative analysis of rocks, minerals, slags, and alloys. (2). Mr. Gibson.

131. **Physical Chemistry.**—(Prerequisite, Organic Chemistry 111.) Stoichiometry of gases, liquids, and solids; solutions and the theory of ionization; thermo-chemistry; the phase rule; chemical equilibrium. Lectures or recitations (two), laboratory (one), (two), or (three). According to amount of laboratory work elected. (3), (4), or (5). Mr. Schlundt.

133. **Electro-chemistry.**—(Prerequisites, Organic Chemistry 111; Physics 3.) Lectures, recitations, and laboratory work in electro-chemical measurements. Lectures (two); laboratory. According to amount of laboratory work elected (3), (4), or (5). Mr. Schlundt.

135a or 135b. **Radioactivity.**—(Prerequisites, undergraduate courses in physics and chemistry.) Lectures, recitations, and laboratory work on the radioactive types of matter and atomic disintegration. (3). Mr. Schlundt.

141a. **Industrial Chemistry.**—(Prerequisite, Qualitative Analysis 27a or 27b, Organic Chemistry 111.) Lectures and recitations on the application of chemistry to the purposes of human life as illustrated in the more important arts and industries having a chemical basis for their principal operations and processes. Fuels, water, acids, fertilizers, cements, glass, pottery, paints, gas, explosives, metals, alloys, etc. Additional credit may be obtained in this course by arranging for laboratory work. (3). Mr. Brown.

142b. **Industrial Chemistry.**—(Prerequisites, same as for 141a.) Starch, glucose, sugar, fats, oils, soaps, dyes, and other industries. Lectures and recitations. (2) or (3). Mr. Brown.

151a or 151b. **History of Chemistry.**—(Prerequisites, Organic Chemistry 111, and Physical Chemistry 131.) May be taken along with course 131. (3).

200. **Chemistry of the Rare Earths.**—(Prerequisites, Quantitative Analysis 121.) Lectures, recitations, and laboratory work on the occurrence, distribution, properties, and uses of the rare earths. (3). Mr. Brown.

211a and 212b. **Advanced Organic Chemistry.**—(Prerequisites, Organic Chemistry 111.) Lectures on selected topics, supplemented by reading and reports on classical researches. (2) or (3). Mr. Calvert; Mr. Jones.

221. **Advanced Quantitative Analysis.**—(Prerequisite, Quantitative Analysis 121.) Chiefly laboratory work. The complete quantitative analysis of rocks, ores, minerals, slags, and various commercial materials and products. The work of the course will be varied to meet the needs of the individual. Credit to be arranged. Mr. Gibson.

232a and 232b. **Advanced Physical Chemistry.**—(Prerequisites, courses 131 and 121.) Lectures on selected topics, supplemented by reading and reports on classical researches. A reading knowledge of German and French is very desirable. Credit to be arranged. Mr. Schlundt.

271. **Research.**—Research is offered in this department in the following lines of work: inorganic, organic, physical, analytical, radio, and electro-chemistry, and micro-metallography. Arrangements for research work should be made by consultation with the professor or instructor with whom the work is elected.

The University of Missouri Section of the American Chemical Society meets fortnightly for reports on current literature and researches in progress in the University. Students are invited to be present. Fridays at 7:00 p. m.

The students of the department conduct a chemical club which meets fortnightly.

GEOLOGY AND MINERALOGY

100a. Economic Geology.—(Prerequisites, courses 5b or 1a or 1b, and elementary chemistry, and Geology 8b or 106a if the course is taken as graduate work.) In this course the origin, mode of occurrence, distribution, uses, methods of obtaining, and conservation of deposits of coal, oil and gas, clays, building stones, cement materials, gypsum, fertilizers, and minor minerals are studied. Field trips to mines and quarries near Columbia will be made. Students will study in laboratory the materials discussed in the class room. (3). Mr. Tarr.

101b. Economic Geology.—(Prerequisites, courses 5b or 1a or 1b, and elementary chemistry, and Geology 106a if the course is taken as graduate work.) In this course deposits of the ores of iron, copper, lead, zinc, gold, silver, nickel, aluminum, and the minor metals are studied with reference to their origin, form, geographic distribution, methods of obtaining, production, uses, and conservation. Students study in laboratory the main ores of each metal. (3). Mr. Tarr.

102b. Advanced Physiography.—(Prerequisite, courses 1a or 1b or 2a or 2b.) A lecture, text-book, and conference course intended for those who wish to do advanced work in geology, and for those who expect to teach physiography in secondary schools. The method will be topical and considerable reading will be required. (3-5). Mr. —.

103a. Historical Geology.—(Prerequisite, course 5b or 1a or 1b. Courses 8b and 6a are desirable antecedents.) This course considers briefly hypotheses for the origin of the earth and, more fully, principles of sedimentation, distribution and kinds of rocks of each geologic period, geographic changes of the North American continent and causes for geographic changes, and incidentally the climate and life of each period. Several field trips are made for the study of the strata in northern Missouri. (3). Mr. Branson.

104b. Geologic Life Development.—(Prerequisites, courses 5b or 1a or 1b and a course in zoology. 103a is a desirable antecedent.) This course considers the changes that have taken place in the life of the earth from its first appearance to the present and the causes for these changes. The life of each geologic period is considered first as a whole, and then in its relationships to the life of the preceding and following periods. In the laboratory students examine specimens that illustrate the gradual evolution toward living types. (3). Mr. Branson.

105. Field Course.—(Prerequisite, 8 hours of geology.) Offered in the summer session. Intended as preparatory for advanced work in geology and as a basis for the teaching of geology and physical geography. The field work will consist of the making of a topographic map of a small area in the Wind River Mountains near Lander, Wyo., mapping the areal geology, describing the formations, collecting in a systematic way from each formation, and reporting on the structural geology, physiography, and economic products. A more general study will be made of a large area in western Wyoming. Special topics are assigned to graduate students, and this work may form the basis for masters' or doctors' theses. (8). Mr. Branson.

106a. Mineralogy.—(Prerequisites, 1a or 1b or 2a or 2b.) A study of the elements of crystallography and the general physical and chemical properties of minerals followed by detailed descriptions of the minerals, including their mode of occurrence, geographic distribution, and origin. The methods of determinative mineralogy, involving the use of the blow-pipe and the consideration of the physical characters of the minerals, are followed in the laboratory. It is the object of the course to make the student familiar with the one hundred and seventy-five to two hundred common minerals. (5). Mr. Tarr.

107b. Petrology.—(Prerequisites, 8b, 106a, Inorganic Chemistry, and General Physics.) The principles of optics as applied to the polarizing microscope and the optical properties of the rock forming minerals are first studied. This is followed by microscopic and megascopic study of the various rock groups. (5). Mr. Tarr.

200a. Principles of Ore Deposits.—(Prerequisites, 8b, 106a, 100a, 101b, Chemistry 6a, and General Physics.) A consideration of the origin of the deposits of the metals and non-metallic minerals, the principles and chemistry of their deposition, and their metamorphism. (3 or 4). Mr. Tarr.

202a. Stratigraphic Geology.—(Prerequisites, 103a and 104b.) Lectures, map work, and field work on the stratigraphy of North America, with more intensive study of a limited area. (5). Mr. Branson.

203b. Paleontology.—(Prerequisite, 104b. Zoology of Invertebrates and Comparative Anatomy of Vertebrates are desirable antecedents.) A somewhat detailed study of a few of the main groups of invertebrates or vertebrates with reference to their evolution and distribution previous to the present period. The content of the course will be varied to suit the needs of individual students. (5). Mr. Branson.

205. Research Work.—Offered by members of the department in their respective lines.

MATHEMATICS

It is especially recommended that students intending to specialize in Mathematics should take courses in French and German in the preliminary work; but an extensive knowledge of the literature of those languages is not necessary.

The courses past course 100 are open only to those who have secured the permission of the instructor in the course.

100. Second Course in Calculus.—This course should be elected by all who have reasonably succeeded in elementary calculus, who desire to continue mathematical work. It will deal with questions necessarily omitted or treated hurriedly in the first course on calculus and will cover approximately the ground indicated by Goursat-Hedrick, *Course in Mathematical Analysis*, including also introductory lectures on sets of points. (3). Mr. Hedrick.

110a and 115b. The Historical Development of Mathematics.—This course is designed as an introduction to higher courses in mathematics, and as a comprehensive view of the whole subject for students who will not pursue mathematics farther. It will consider the main problems, the point of view, and the methods of the principal higher divisions of mathematics, together with an intensive study of typical topics selected from a wide range. The treatment of any topic will be accompanied by a consideration of the larger significant facts in the history of its development. While the two courses 110a and 115b form essentially one course, the latter is so arranged that it may be elected independently of 110a by suitably prepared students with special permission. (3). Mr. Ames.

120a and 125b. Differential Equations and Their Applications.—A short time will be spent in the consideration of differential equations and in the formal solution of some of the simpler types. This will be followed by the careful study and solution of certain problems of geometry, physics, and other sciences in which differential equations occur. Course 125b is arranged to permit of its election independent of 120a by specially prepared students with special permission. (3). Mr. Ingold.

160a or b. Probabilities and Statistics.—This course will cover the fundamental elementary topics in the theory of probabilities, including the theory of least squares; and it will contain a variety of applications of the theory, such as life insurance, statistics, and scientific observations. Problems of finance will be treated. (2).

200a or b. Seminary.—The members of the staff will conduct work in reading and research in private with students prepared for such work. The nature and amount of the work done may vary materially. The course may be elected repeatedly in different semesters for different work and for any number of hours sanctioned by the instructor.

205a or b. **Modern Algebra.**—The nature of the course is best indicated by such reference books as Weber's *Algebra* and Bocher's *Higher Algebra*. Alternate years. Given 1913-14. (3). Mr. Dunkel.

210a or b. **Differential Geometry.**—Lectures. Introduction to the theory of modern differential geometry. Reference books: Eisenhart; Joachimstahl; Wilczynski; Bianchi. Naturally follows either course 100 or 115b. (3).

215a or b. **Projective Geometry.**—Lectures, supplemented by reading. Reference books: Emch; Veblen and Young; Reye; Scott. Alternate years. Given 1912-13. (3). Mr. Ingold.

220a or b. **Fourier's Series and Allied Series.**—Introduction to mathematical physics. Lectures, supplemented by reading. (3).

225a or b. **Potential Function.**—Properties of potential functions; boundary value problems; and applications. Continuation of 220a. Lectures, supplemented by reading. Alternate years. Given 1912-13. (3). Mr. Kellogg.

230. **Theory of Functions of Real Variables.**—Higher Analysis, including the most important features of mathematical analysis, in a comprehensive but elementary manner. Lectures, supplemented by reading. Alternate years. Given 1912-13. (3). Mr. Hedrick.

235. **General Theory of Functions.**—Given 1913-14. (3). Mr. Hedrick.

240. **Theory of Functions of Complex Variables.**—A general course, covering the theories of Riemann, Cauchy, and Weierstrass, in their elementary phases. Theory of functions of a complex variable; elliptic functions. (3).

250. **Graphical Analysis.**—Graphical computations, such as construction of rational functions, solution of differential equations, construction of graphical tables, and a treatment of certain topics of analysis. (1). Mr. Kellogg.

260a or b. **Theory of Groups, with Application to Galois' Theory and Lie's Theory.**—Lectures. (3).

280a or b. **Calculus of Variations.**—A course on the theory of maxima and minima for functions defined on a general range. Emphasis is laid on the applications. References to Hadamard, Bolza, and other treatises. Alternate years. Given 1913-14. (3). Mr. Westfall.

Among the courses, the following are offered occasionally, when the needs of the student seem to warrant:

255a or b. **Theory of Differential Equations.**

265a or b. **Theory of Numbers.**—(3).

270a or b. **Analytical Mechanics.**—(3).

275a or b. **Partial Differential Equations of Mathematical Physics.**—(3).

Mathematical Clubs.—The students of the department conduct, for the discussion of mathematical topics, a club, to which all persons interested are eligible. The members of the staff of the department hold regular meetings for the discussion of current literature and of recent research, which are open also to qualified graduate students.

For other courses on mathematical topics, see also the announcements of Physics and of the School of Engineering.

PHYSICS

Students intending to specialize in Physics should also take Mathematics. Even in the less mathematical courses some knowledge of Calculus is of great advantage.

104a. **Electrical Measurements.**—Two lectures and three laboratory periods. In the lectures is given an introduction to the mathematical theory of electricity and electrical measurements. The laboratory work consists of such work as comparisons of resistances by Kelvin double bridge and Carey Foster methods; determination of temperature coefficients; comparison of electromotive forces of cells; various uses of the potentiometer; comparison and absolute measurement of capacities; measurement of the coefficient of self and mutual induction; calibration of ammeters and voltmeters; photometric work with incandescent lamps. (5). Mr. Rentschler.

106a and 106b. **Mechanics and Heat.**—Laboratory work similar to that given in course 108. Standard experiments in angular motion, acceleration of gravity, conservation of momentum, moment of inertia, elasticity, efficiency of machines, etc. Experiments in heat will involve a study of such things as specific heats of solids and liquids, heats of combustion, vapor densities, the simpler laws of radiation, and different methods of measuring high and low temperatures. Work in either mechanics or heat may be selected to meet the individual needs of the student. (1), (2), or (3). Mr. Heaps.

108a and 108b. **Electricity and Light.**—This course is entirely laboratory work and must be preceded by either course 1 or 3. It offers training in the more exact methods of laboratory measurements. The work is entirely individual so that the time may be spent either on optical or electrical problems. In light the work is quantitative, consisting of measurements of wave lengths by interference methods, Fresnel mirrors, interferometers, etc.; determinations of refractive indices; study of resolving power of optical instruments and similar problems. In electricity the work is the same as the laboratory work of course 104a. (1), (2), or (3). Mr. Reese and Mr. Rentschler.

109. **Advanced Work in General Physics.**—This course, largely laboratory work, will be adapted to meet the needs and attainments

of individual students. A student may be assigned a definite problem, the literature of which must be studied and the experimental work performed with the care of original research. (2) or (4). Mr. Stewart, Mr. Reese.

110b. Electricity and Magnetism.—This course, largely descriptive, is planned to meet the needs of students who are not prepared to take the more mathematical work of 207. Students desiring laboratory work in connection with this course can elect one or two hours of course 108. Lectures and recitations. (3). Mr. Rentschler.

112a. Heat.—(3).

112b. Light.—(3).

These courses are open to those who have completed course 3 or 4 or its equivalent. This work is recommended to those who either intend to teach in high schools or desire work more general in character and less mathematical than courses 205, 206, 207, and 215. Students desiring laboratory work in connection with these courses may elect one or two hours from course 108 or 106. (3). Mr. Heaps.

117b. Spectroscopy.—A practical course in the use of various forms of spectrosopes and the applications to physical problems. Open to those who have had course 1 or 3. (2). Mr. Reese.

Courses 205, 206, 207, and 215 are courses in Mathematical Physics.

205. Theory of Light.—Based on Drude's Theory of Optics. Special attention is given to the electromagnetic theory. Lectures and recitations. (3). Mr. Stewart.

207. Theory of Electricity and Magnetism.—Lectures and recitations. (3). Mr. Stewart.

Courses 205 and 207 will not both be given in the same year.

206. Thermodynamics.—Lectures on the classical thermodynamics with its application to the theory of heat radiation and certain branches of physical chemistry and electricity. The more modern views, based on atomic theories, are also taken up, and the student is introduced to statistical mechanics. Differential and integral calculus are prerequisite, and an understanding of the more general principles of mechanics is desirable. (3). Mr. Reese.

215. Dynamics.—Introduction to the fundamental principles of Mathematical Physics. (3). Mr. Reese.

221b. Electrical Waves.—Theory and applications. (2). Mr. Stewart.

210. Seminary.—Critical reading and discussion of current research work in Physics. A colloquium in which all members of the teaching staff of the department and students of sufficient attainments take part. (1).

211. Research Work.—Hours to be arranged. Mr. Stewart, Mr. Reese, Mr. Rentschler.

225a and 225b. **Recent Developments in Experimental Physics.**—Lectures and demonstrations. (1). Mr. Rentschler.

226. **Recent Developments in Theoretical Physics.**—Lectures and assigned readings. (2). Mr. Reese.

GROUP OF BIOLOGICAL SCIENCES

ANATOMY AND HISTOLOGY

105a. **Topographic Anatomy.**—A study of the topography of the various organs by means of serial sections through the body. Open only to students who have completed the undergraduate courses in anatomy. Laboratory. (2). Mr. Johnson.

206. **Advanced Anatomy, Histology, or Embryology.**—The amount and character of the work will be varied to suit individual needs. This course is open only to students who have had the elementary courses in anatomy, histology, or embryology. Laboratory. Hours to be arranged. Mr. Johnson; Mr. Myers.

207. **Research.**—Problems of original investigation will be assigned in anatomy, histology, or embryology. A reading knowledge of French and German is required. Hours to be arranged. Mr. Johnson.

BOTANY

100a. **Plant Physiology.**—Lectures and laboratory work on the physiology of the common cultivated plants, covering such topics as absorption, transpiration, synthesis of carbohydrates and proteins, digestion, translocation, respiration, growth, reproduction, and the reaction of plants to stimuli as light, gravity, etc. (3 or 5). Mr. Reed.

102b. **Physiology of the Fungi.**—(Prerequisite, Botany 2a.) Lectures and laboratory work on the physiology of the fungi. Special emphasis will be placed on the nutrition of fungi, including methods of isolation and pure culture. Attention is also given to the methods of infection, effect on the host plant, etc., of some of the parasitic forms as rusts, smuts, and mildews. (3). Mr. Reed.

103b. **Soil Bacteriology.**—(Prerequisite, Botany 3.) A Course dealing with the relation of micro-organisms to soil problems. Nitrogen fixation, nitrification, denitrification, and the effect of various factors on the number and kinds of organisms in the soil are considered. (3). Mr. Gainey.

104a. **Histological Methods.**—The student will learn the methods used in the preparation and preservation of class material in bulk, and in fixing, sectioning, and staining of sections for microscopical study. (2). Mr. Durand.

105. **Comparative Morphology and Embryology.**—A detailed study of the structure and life history of selected representatives of the great groups of green plants. Special attention will be given to tracing the development and homologies of sterile, sporogenous, and reproductive parts such as the formation of spores and gametes, fertilization, the development of the embryo, etc. The nuclear changes accompanying fertilization and sporogenesis will be followed. This course may profitably be preceded or accompanied by courses 4b, 5a, 6b, and 104a. Lectures and laboratory. (3). Mr. Durand.

106b. **Principles of Plant Breeding.**—A discussion of the fundamental principles of plant breeding, including parthenogenesis, hybridization, Mendelian phenomena, etc. Lectures and reports on assigned readings. (3). Mr. Reed.

108b. **Diseases of Forest Trees.**—(Prerequisite, Botany 2a.) The course takes up a study of the fungous diseases of forest trees, the fungi which cause decay in timber and the methods of timber treatment. (3). Mr. Reed.

200. **Seminar.**—Special subjects of botanical work will be taken up and discussed. For the session of 1914-15 the subject will be the absorption and role of water and minerals in plants. In addition, the results of investigations carried out in the department will be presented. A reading knowledge of French and German is essential. (1). Mr. Reed.

201. **Research.**—Students who have had adequate preparation will be assigned some special problem for investigation. A reading knowledge of French and German is essential. Credit and hours to be arranged. Mr. Reed; Mr. Durand.

PATHOLOGY

201a and 201b. **Advanced Pathology.**—(Prerequisite, Pathological Bacteriology 102a and Pathology 103b.) Choice may be made of either Medical Bacteriology or Pathological Anatomy. The amount and character of the work will depend upon the needs and qualifications of the student. In connection, opportunity will be afforded for practical experience in the handling of all kinds of morbid material. Hours to be arranged. Mr. Dolley; Mr. Mitchell.

202. **Research.**—Opportunity is offered to students sufficiently prepared for original investigation of unsolved problems in the fields of Bacteriology, Pathology, and Pathological Physiology. A reading knowledge of German is required and one of French is recommended. A seminary is held once a week. Mr. Dolley; Mr. Mitchell.

203. **Normal and Abnormal Neurocytology.**—The application of the general principles and theories of biology to the nerve cell in health and disease. The work will necessarily consist largely of original inves-

tigation and will be adjusted to the training of the student. Hours to be arranged. Mr. Dolley.

204a. **Pathological Physiology.**—An experimental course. (2). Mr. Dolley.

PHYSIOLOGY

101a. **General Physiological Chemistry.**—(Prerequisite, Organic Chemistry 111.) Physiological Chemistry of the carbohydrates, fats, and proteins; of the cell and special tissues; of the blood; of secretions and of excretions; a quantitative study of the urine in relation to diet. One lecture and two laboratory periods a week. (3). Mr. Gulick; Mr. Boutwell.

102a. **Physiology of Alimentary Mechanisms, Metabolism, and Reproduction.**—The Physiology of secretory processes, digestion, absorption, excretion, respiration, metabolism and energy exchange, heat regulation, and reproduction. Two lectures and one laboratory period. (3). Mr. Gulick; Mr. Boutwell.

103a. **Experimental Physiology.**—The physiology of muscle and nerve, circulation, respiration, nervous system, and sense organs. (6). Mr. Greene; Mr. Peeler.

The laboratory work of this course is open, for three hours credit, to students who present 1a or 1b supported by sufficient collateral work in biological or physical science. (3).

104a and 104b. **Advanced Physiological Chemistry.**—A course supplementing and extending course 101a. The preparation and chemistry of the proteins; a qualitative and quantitative study of the tissues and secretions, of enzymes, of putrefaction and putrefactive products; analyses of typical foods, and the detection of food preservatives and adulterants. The prosecution of a short investigation and formal report on the same are required. (2 to 4). Mr. Gulick.

105b. **Pharmacology.**—This course presents the physiological action of drugs from the experimental point of view. The demonstrations are made on man and the lower animals. (4). Mr. Greene; Mr. Boutwell.

107b. **Toxicology.**—Prerequisites 104a or 105b. (2 to 3). Mr. Gulick.

206a. **The Physiology of the Nervous System.**—(3). Mr. Greene.

208. **Journal Club.**—(1). Mr. Greene.

209a. **The Physiology and Pharmacology of the Circulatory System.**—(3). Mr. Greene.

210. **Advanced Physiology.**—Advanced courses in Physiology, Physiological Chemistry, and Pharmacology. Individual problems will be assigned to students of sufficient preparation. Hours to be arranged. Mr. Greene; Mr. Gulick.

211. **Investigation.**—Opportunity is offered for research into questions of current physiological interest. Mr. Greene; Mr. Gulick.

ZOOLOGY

100a. **Embryology of Vertebrates.**—The course is designed to lay the foundation of vertebrate embryology. Successive stages in the development of the frog, the chick, and the pig are studied from preparations of entire embryos and from serial sections. These observations are used as a basis of comparison for the study of human embryology. (3). Mr. Lefevre; Mr. Tannreuther.

101b. **Comparative Embryology of Invertebrates.**—A comparative study of the development of representative forms from the principal phyla of the invertebrates, including a consideration of general phylogenetic and morphological problems. (3). Mr. Curtis.

102b. **Cytology.**—A study of the cell, with special reference to problems of development and inheritance. Cytological technique. (3). Mr. Lefevre.

104a. **Genetics and Evolution.**—A course of lectures dealing with the experimental study of genetics and its relation to the problems of evolution. Emphasis is laid on the phenomena of Mendelian inheritance and the cellular mechanism of heredity. (2). Mr. Lefevre.

200. **Research.**—The investigation of unsolved problems of zoology, in which the student is trained in the exercise of original observation and thought. A reading knowledge of French and German is essential. Hours to be arranged in accordance with the requirements of individual students.

201. **Seminary.**—Meetings at which subjects of zoological investigation are discussed by instructors and students. Each student is required to give at least four lectures during the year, and experience is thus gained in presenting, in the form of lectures, the results of reading and research. A reading knowledge of French and German is essential. (1).

GROUP OF AGRICULTURE

AGRICULTURAL CHEMISTRY

101a and b. **Advanced Agricultural Chemistry.**—This course is a continuation of the regular undergraduate course in agricultural chemistry, which is required of all undergraduate students in agriculture. A critical study of methods in use in the chemical laboratories of the experiment station will be made, including an examination of foods and feeding stuffs for adulteration, etc. Three to five periods per week, including one lecture or recitation each week. Hours to be arranged. Mr. Trowbridge; Mr. Moulton; Mr. Haigh.

201a and b. **Seminar.**—(1). Mr. Trowbridge.

202a and b. **Research.**—This course can be elected either as major or minor for advanced degrees, and may include a thesis showing the re-

sults of the investigations. The chemical laboratories offer exceptional facilities for research. Subjects may be selected in (a) animal nutrition; (b) composition of animal fats as affected by feeding, age, breed, etc.; (c) the composition of meats, feeding stuffs, fertilizers, soils, etc.; (d) the chemical problems involved in the dairy industries; (e) the distribution of phosphorus in the animal organism with special reference to the separation of phosphorus compounds; (f) chemical problems involved in the enforcement of state and national pure food laws; (g) the separation of the proteins of flesh and study of their hydrolytic cleavage products. (3 to 5). Mr. Trowbridge; Mr. Moulton; Mr. Palmer; Mr. Haigh.

203a. Chemistry of the Proteins.—A critical study of the composition and classification and of the decomposition products of the meat and vegetable proteins. Lectures and recitations. (3). Mr. Trowbridge.

204a. Physiological Chemistry of the Domestic Animal.—This course is designed to meet the requirements of students fitting themselves for investigations in animal nutrition. (3). Mr. Trowbridge; Mr. Moulton; Mr. Palmer.

AGRONOMY

102a. Cereal Breeding.—A study of the methods of plant breeding as applied to cereals and forage crops. Laboratory exercises in studying methods followed at the Experiment Station, and also in the use of biometric methods in analyzing data. (2). Mr. Hutchison.

200b. Soil Investigations.—A study of methods of soil investigation and of special soil problems. Particular attention is given to methods and results of soil investigations in the United States and Europe. One lecture and two laboratory periods a week. (3). Mr. Miller; Mr. LeClair.

201. Special Investigations.—Original investigations in soils, crops, or farm engineering. The special work undertaken is determined by the preparation and the needs of the student. Hours to be arranged. Mr. Miller; Mr. Hutchison.

202. Seminar.—Discussion of various phases of agronomic investigations. Papers on assigned topics are presented for discussion. A reading knowledge of French and German is recommended. (1). Mr. Miller.

ANIMAL HUSBANDRY

200. Seminar.—Special investigation bearing on selected lines in Animal Husbandry. The preparation and presentation of papers for discussion by the class. (2). Mr. Mumford; Mr. Trowbridge; Mr. Allison.

201. Experimental Feeding.—Original investigations of important problems in feeding cattle, sheep, and swine. This course is intended to

give experience in methods of experimental work and to make the student familiar with the most approved methods of investigation. Mr. Trowbridge; Mr. Allison.

202. **Research in Animal Husbandry.**—Advanced studies of special phases of Animal Production. Recommended to students who desire more thorough training in the production of cattle, horses, sheep, or swine, or who may wish to make a more careful study of the fundamental principles of Animal Husbandry. Mr. Mumford; Mr. Trowbridge; Mr. Allison.

203. **Animal Breeding.**—Research in special subjects bearing on the inheritance and development of characters in the domestic animals. Mr. Mumford.

204. **Zoometry.**—Special investigation of the relations of form and function in the domestic animals. Mr. Trowbridge.

205. **Research in Stock Farm Management.**—Investigations of the principles governing successful systems of stock farm management. Special studies of highly efficient stock farms. Mr. Mumford; Mr. Trowbridge; Mr. Allison.

DAIRY HUSBANDRY

100b. **Milk Production.**—The breeds of dairy cattle; selection, breeding, and development of a dairy herd; care and management of dairy cattle; feeding for milk production; production of certified and market milk; milk for butter-making and cheese-making; utilization of by-products of the dairy. Mr. Eckles.

201. **Seminar.**—The object of this course is to train the student to do independent work, and to develop the spirit of research. It consists of special investigation and study along selected lines of research with review and discussions of recent work. Each student presents papers on selected topics and reports on recent scientific investigations and on current literature of the subject. Mr. Eckles.

202. **Research in Dairy Husbandry.**—A large herd of highly developed dairy cattle representing four breeds makes it possible to offer facilities for study and investigation on a variety of subjects pertaining to milk production and the care and management of dairy cattle. Students interested in this line are allowed to carry out certain experiments with the dairy animals and in some cases to assist in lines of investigation under way in the Experiment Station. Mr. Eckles.

203. **Special Investigations in Composition of Milk.**—An extended series of investigations is under way regarding the factors that influence the composition of normal milk. A certain number of students are allowed to assist in these investigations and to undertake small problems independently. Mr. Palmer.

204. Dairy Bacteriology.—This will be laboratory investigation of certain problems of bacteriology in relation to dairying, the object being chiefly to give training in methods of research in this line. The work will be adapted largely to the individual student. Mr. Eckles.

205. Dairy Manufactures.—Opportunity and facilities are given to study and investigate problems in butter-making, cheese-making, and other lines of dairy manufactures. Mr. Rinkle.

ENTOMOLOGY

110b. Advanced Economic Entomology and Insectary Methods.—Lectures, laboratory, and field work. Open only to students who have taken course 1b or 2a. Two afternoon periods a week by appointment. (2). Mr. Haseman.

111a. Morphology, Histology, and Development of Insects.—Open only to students who have taken courses 1b, 103a, and 104b. Lectures and demonstrations. (2). Mr. Haseman.

200. Research.—Opportunity is offered for original investigation of Economic, Morphologic, and Systematic problems presented by our local insects fauna. Mr. Haseman.

FARM MANAGEMENT

112a. Farm Records.—(Prerequisite, farm accounts, 105a.) A detailed study of the results of record work—what the records reveal in the way of successful or unsuccessful management and methods. (2). Mr. Johnson.

112b. Farm Administration.—The application of the principles gathered in 110b; making detailed and balanced plans for special farms and considering the handling and management of crops and stock under those special conditions. (2). Mr. Johnson.

114. Seminar.—Selected literature and special field investigations of farm management problems, to be used as the basis for original outlines, and detailed plans for improving systems of farming. Mr. Johnson; Mr. Foard.

201. Investigation of Types of Farming.—Field investigations of the different types of farming occurring in a given region, including careful and detailed study of farm practices and incomes. Thesis required. Mr. Johnson; Mr. Foard.

202. Investigation of Cost of Production and the Distribution of Labor.—Field investigations of the comparative cost of producing farm products and the distribution of labor on Missouri farms. Thesis required. Mr. Johnson; Mr. Foard.

207. Investigation of Systems of Farm or Rural Practices and Organizations.—Original research covering present farm practices and their

practical application. Also a study of rural institutions or organizations that directly affect or are related to farm management. Thesis required. Mr. Johnson; Mr. Foard.

HORTICULTURE

111. Advanced Pomology.—A study of the principal species, types, and varieties of cultivated fruits and their related forms, together with a consideration of their variations, modifications, and adaptations under culture. The living plant collections and preserved specimens on the Horticultural Grounds afford material for the work. Hours by appointment. Mr. Whitten.

113. Olericulture.—Exhaustive studies of special groups, species, types, and varieties of garden vegetables, together with their cultural requirements and adaptations to special purposes. Mr. Whitten; Mr. Howard.

114. Ornamental Plants.—(Prerequisite, Botany 4b; Horticulture 8b.) Lectures, laboratory, and assigned readings on the identification and classification of ornamental plants used in Landscape Gardening. The making of herbaria. (3). Mr. Major.

115a. Elementary Landscape Designs.—(Prerequisite, Horticulture 8b, 114.) Draughting-room exercises. (3). Mr. Major.

215. Special Investigation.—This course is intended for graduates and advanced students. Special topics for investigation will be assigned. Hours by appointment. Mr. Whitten; Mr. Howard; Mr. Major.

VETERINARY SCIENCE

201. Topographic Veterinary Anatomy.—(Prerequisite, Course 1a.) A study of the topographic anatomy of the horse, ox, and pig by means of serial cross-sections of preserved cadavers, supplemented by a study of anatomical surface points on the living subject.

This course is designed to meet the needs of advanced students who intend to specialize in Animal Husbandry along the lines of stock judging and meat production. (3). Mr. Connaway.

202. Contagious, Infectious, and Parasitic Diseases of Farm Animals.—In this course an effort is made to present as many clinical cases as possible, in order that the student may gain a practical knowledge of the clinical features as they are encountered in field experience. Experimental inoculations supplement the clinical study. Autopsies are made and the gross and microscopic lesions studied. The specific causes (bacteria and other micro-parasites and macro-parasites), where known, are isolated and studied. Such ground relating to this group of diseases as has been well covered in the minor course 3a is not repeated in this course

Text and reference books: Friedberger and Froehner's "Veterinary Pathology," Vol. II, "Infective Diseases"; Law's "Vet. Med.," IV; Ostertag and Wilcox's "Meat Inspection"; Neumann's "Parasites and Parasitic Diseases"; Nocard and Loclainche's "Les Maladies Microbiennes des Animaux"; Kitt's "Bacterienkunde." Special Bulletins and Veterinary Journals. Lectures, assigned reading, clinics, and laboratory work. (3). Mr. Connaway.

203. **Investigation.**—Students who have suitable preparation will have an opportunity to assist in the Experiment Station work. Studies on immunity in relation to hog cholera will continue to be the principal line of investigation during the coming session. (6). Mr. Connaway.

THEORY AND PRACTICE OF ART

103. **Theory and Design.**—(Prerequisite, course 2a (2b) or its equivalent.) The study of design as an art activity fundamental to the fine arts and crafts and a basis for art criticism. The problems of pure design; the relation of the art product to its environment; the relation of the aesthetic to other factors in the work of art; the application of the principles of design to definite problems. Two lectures and one laboratory period a week. (3). Mr. Ankeney; Mr. Carr.

105. **Pictorial Composition.**—(Prerequisite, course 4 or courses 2a (2b) and 103. Exception may be made to students possessing technique of photography.) Study and practice in the making of pictures. (2). Mr. Ankeney.

106. **Painting.**—(Prerequisite, course 4, while course 103 is advised in addition.) Style, theory, and methods of various schools and movements. Lectures, study of examples, and reading. Experimental practice in painting from still life and life, with work in original composition. (3). Mr. Ankeney.

107. **Tone.**—An advanced painting course. A close analysis of the composition and relation of tones (value, color quality, intensity), with the equivalents in pigments in interpreting both indoor and outdoor subjects. Two periods a week will be given to work directly under the instructor, in addition to which the student will be expected to paint a great deal alone, bringing in the work for criticism. (3-5). Mr. Ankeney.

108. **Life.**—An advanced drawing course. Drawing and modeling the figure from life. (3-5). Mr. Ankeney; Mr. Carr.

208. **Seminary.**—A research course in the processes of the Old Masters with the adaptation of their traditions to modern work. Mr. Ankeney.

HISTORY OF ART

111. **History of Renaissance Painting.**—First semester: Italian Painting. Second semester: Painting of the Netherlands and of Germany. This course should be preceded or accompanied by European History (History 1a). With Italian Painting, European Culture and Civilization (History 150a) is also earnestly recommended. (3). Mr. Pickard.

113. **Masterpieces of Architecture, Sculpture, and Painting of Classical, Renaissance, and Modern Times.**—Lectures fully illustrated with the stereopticon. This course aims to show the historical development of art by the discussion of some of the finest examples in each of the three divisions mentioned. (1). Mr. Pickard.

216. **Seminary in the History of Art.**—Hours and work to be assigned. Mt. Pickard.

As supplementary to all courses offered in the history of Painting and of Sculpture, Introduction to Art (Theory and Practice of Art) is recommended.

For courses in Classical Archaeology and Art, see page 9.

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UNIVERSITY CALENDAR

AT COLUMBIA

1914

Summer Session

| | |
|---------------|---------------------------------|
| June 11..... | Thursday, registration |
| June 12..... | Friday, organization of classes |
| July 4..... | Saturday, holiday |
| August 6..... | Thursday, lectures close |
| August 7..... | Friday, examinations |
| August 8..... | Saturday, entrance examinations |

First Semester

| | |
|---------------------------|---|
| September 14, 15, 16..... | Monday, Tuesday and Wednesday, entrance examinations and registration |
| September 17..... | Thursday, 8 a. m., class work in all divisions begins |
| September 17..... | Thursday, 10 a. m., opening convocation |
| October 1..... | Thursday quarterly meeting of curators |
| November 3..... | Tuesday, election day, holiday |
| November 26..... | Thursday, Thanksgiving, holiday |
| December 15..... | Tuesday, annual meeting of curators |
| December 18..... | Friday, 4 p. m. to |

1915

Christmas holidays

| | | |
|-----------------|-----------------|-------------------------|
| January 4..... | Monday, 8 a. m. | } Mid-year examinations |
| January 23..... | Saturday to | |
| January 30..... | Saturday | |

Second Semester

| | |
|-------------------------|---|
| January 28, 29, 30..... | Thursday, Friday and Saturday, entrance ex- aminations |
| February 1, 2..... | Monday and Tuesday, registration, second semester |
| February 3..... | Wednesday, 8 a. m., class work in all divisions begins |
| February 4..... | Thursday, 10 a. m., opening convocation |
| February 22..... | Monday, Washington's Birthday, holiday |
| April 1..... | Thursday, quarterly meeting of curators |
| April 1..... | Thursday, 4 p. m., to } Easter holidays |
| April 7..... | Wednesday, 8 a. m. } |
| May 30..... | Sunday, baccalaureate address |
| May 31, June 1..... | Monday and Tuesday, senior class exercises |
| June 2..... | Wednesday, alumni day |
| June 3..... | Thursday, commencement day |
| June 3..... | Thursday, semiannual meeting of curators |
| June 4..... | Friday, to } Final examinations |
| June 11..... | Friday } |

INFORMATION ABOUT THE UNIVERSITY

GENERAL STATEMENT

The fundamental aim of the University of Missouri is the development of the highest and most efficient type of citizen. For the purpose of attaining its aim, the University furnishes ample facilities for liberal education and for thorough professional training. The University is a part of the public educational system of the State.

ORGANIZATION

The work of the University is now carried on in the following Colleges and Schools:

- College of Arts and Science
- College of Agriculture
- School of Education
- School of Law
- School of Journalism
- School of Medicine
- School of Engineering
- School of Mines and Metallurgy
- Graduate School
- Extension Division

All of these divisions are at Columbia with the exception of the School of Mines and Metallurgy, which is located at Rolla. In addition, emphasis is given particular lines of work by the establishment of minor divisions, the chief of which are the Agricultural Experiment Station, the Engineering Experiment Station, and the Military Department.

LOCATION

The University of Missouri is located at Columbia, situated half way between St. Louis and Kansas City near the center of the State. It is reached by the Wabash and the Missouri, Kansas and Texas Railways. Columbia is a progressive and prosperous town having doubled its population in the last few years. It has nearly twenty miles of paved streets.

Columbia may be characterized as a town of schools, homes, and churches, with enough of industrialism to make it efficient. It offers the conveniences of a larger city without the counter attractions. The student is a predominant factor in Columbia.

EQUIPMENT

The University grounds cover more than eight hundred acres. The main divisions are in the Quadrangle, the Horticultural Grounds, the Physical Education Grounds, and the Agricultural College Farm.

The following University buildings are located at Columbia: Academic Hall; Laws Observatory; separate buildings for Chemistry, Agricultural Chemistry, Physics, Biological Sciences, and Geology; Engineering; Manual Arts; three power houses; Medical Laboratory Building; Parker Memorial Hospital including the Busch Clinic; Agricultural Building; Horticultural Building; Green Houses; Live-Stock Judging, Dairy, Farm Machinery, and Veterinary Buildings, and the Agricultural Farm Barns and Buildings; Switzler Hall for the School of Journalism; Benton and Lathrop Halls, dormitories for men; Read Hall, the dormitory for women; Rothwell Gymnasium; the houses for the President of the University and the Dean of the College of Agriculture; the High School, and the Elementary School Buildings, used for practice schools in the School of Education. A new Library Building is in process of erection.

FOR FURTHER INFORMATION

For further information in regard to the Graduate School of the University, address

CHAIRMAN OF GRADUATE COMMITTEE,
University of Missouri,
Columbia, Missouri.

Full information regarding the University is given in the catalogue which will be sent on request without charge. For this or special bulletins of the College of Arts and Science, College of Agriculture, School of Education, School of Law, School of Medicine, School of Engineering, School of Journalism, Extension Division, and the Graduate School, write to

DEAN OF THE UNIVERSITY FACULTY,
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THE
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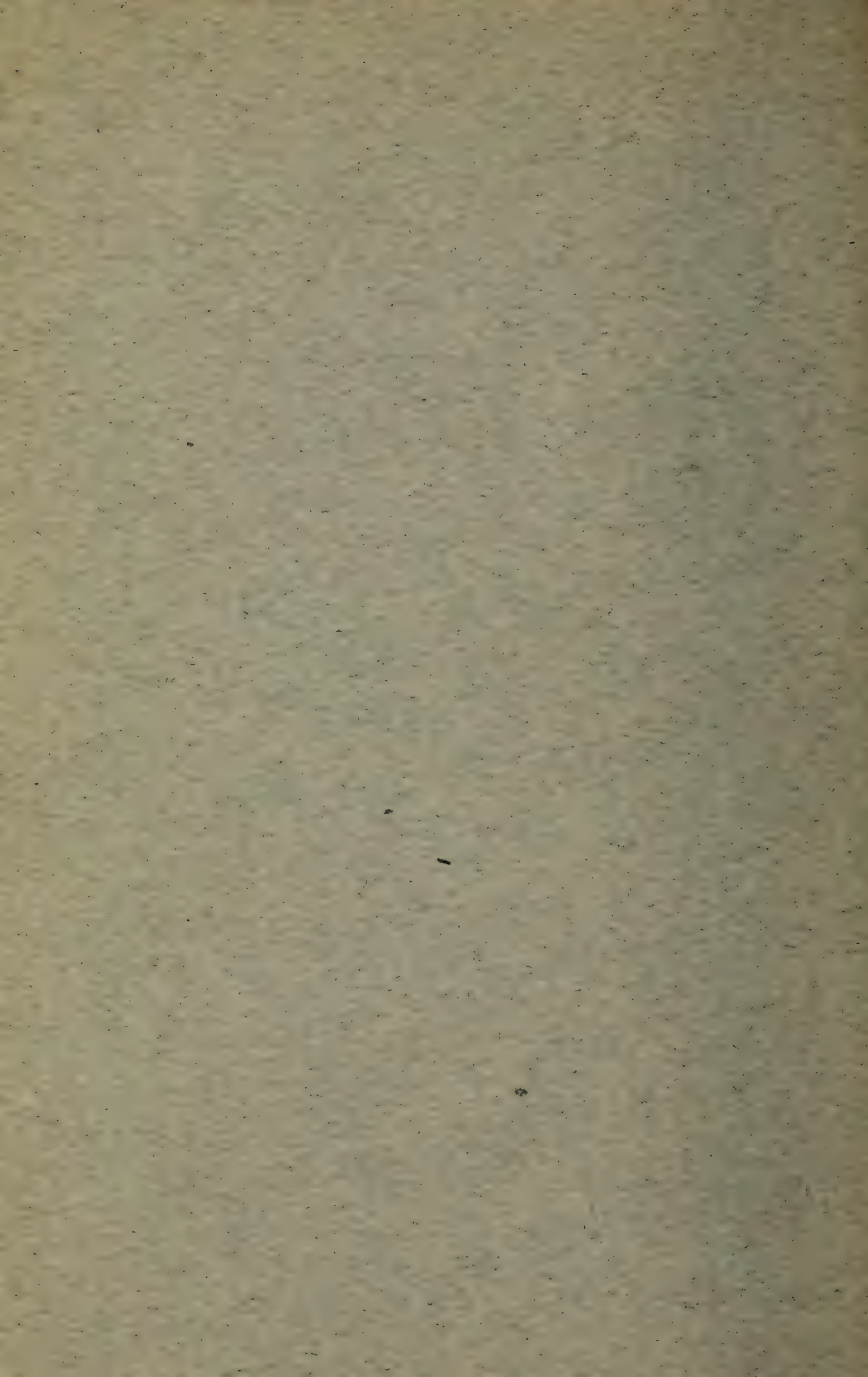
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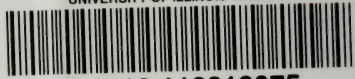
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